

THE MICRO USER

Volume 9

Number 5

July 1991

£1.50

IN PERSPECTIVE

Draw accurate 3D pictures

ICONS BY DESIGN

Brighten up your programs

TOTAL CHAOS

Paint programs to the rescue

SOFT SCROLLING

Find out how games work

DATA SECURITY

Foolproof file protection

Reviews

Speech!

DT-Talk

SpeechSystem

Arcade Game Creator

...plus all the
latest
games

WINDOWS & NEUTRON
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For ALL users of the BBC Micro, Master, Electron, Archimedes series and A3000



SPECIAL OFFER

Phone for details of our latest special offers.
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**THE WORLDS
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MICRO**

A3000	£599
410/1	£1099
420/1	£1299
440/1	£1699
The Learning Curve	£699
Arc. Learning Curve	£1299
Jet Set Pack	£649

*** NEW PRODUCT ***

JET SET PACK

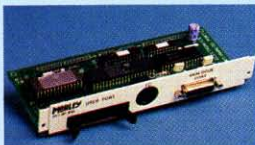
A3000 with "monitor quality" adaptor eliminates the need to purchase a dedicated monitor. Comes with four games - Interdictor, Superior Golf, Trivial Pursuit and Euclid - as well as the usual A3000 bundled software. £649

**No Monitor
Needed!
TV Modulator
Included**

ARCHIMEDES PERIPHERALS

Microvitec CUB3000	£189	Econet Upgrade	£49
Acorn Colour Monitor	£199	Acorn Rom Podule	£56
Philips 8833	£219	300 2 Slot Backplane	£37
Mono Monitor	£73	300 4 Slot Backplane	£59
Monitor Stand	£19	300/400 I/O Podule	£85
A3000 User Port & Midi	£49	300/400 Midi Podule	£69
Serial Upgrade	£19	300/400 3.5" Drive	£115

A3000 BBC ANALOGUE & USER PORT PODULE



Full specification BBC analogue and user port. The analogue port is accessible using ADVAL from BASIC5 with all BBC OSbyte calls supported.

£69

Interface software written by Acorn for maximum compatibility with the BBC.

TELETEXT

The Morley Teletext Adapter is now available for the Archimedes. Advanced specifications, include digital tuning, screen dumps etc. Connects via the external podule socket or our Analogue/User Port. £125

Existing users of our BBC Teletext Adapter can have the unit converted to an Archimedes version. £35

ST506 HARD DISK DRIVE UNIT

Faster and cheaper than 8 bit SCSI.



INTERFACE
ST506 Podule Kit £169

A3000 DISK DRIVES

Including ST506 Podule, cased drive with power supply, cable & leads

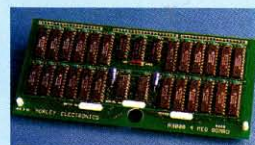
20MB	£379
40MB	£459
55MB	£559

CALL FOR 300/400 PRICES

MEMORY EXPANSION

THE BEST VALUE MEMORY UPGRADES

Unlike most other cards, our upgradeable card can be upgraded from 1MB to 3MB at a later date for maximum flexibility.



- Fully compatible with all Acorn software.
- A must for all serious Archimedes owners.
- Make full use of powerful RISC-OS packages.

A3000 1MB Expandable	£89
A3000 1MB Non-Exp.	£65
A3000 3MB Upgrade	£179
A3000 1MB to 3MB	£140
305 1/2MB	£69
400 Series 1MB	£50

A3000 3.5" SECOND DRIVE



- Easy to install - simply plug in and run.
- High quality Japanese drive.
- Includes full fitting kit and instructions

£125

A3000 5.25" SECOND DRIVE



- Kit includes:
- 5.25" Teac 80 track drive
 - Case
 - Power supply
 - Interface and leads

£169

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INTERFACES
A3000 SCSI Podule £149
300/400 SCSI Podule £149

A3000 DISK DRIVES

Including SCSI Podule, cased drive with power supply, cable & leads

20MB	£399
40MB	£459
60MB	£559

CALL FOR 300/400 PRICES

O.N.I.C.S. L.T.D

SOFTWARE

This is a small selection of the software that we can supply at competitive prices. Please call for any item you require.

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Pipedream3	£119
1st Word +	£65
Minerva Home Accounts	£79
Acorn Desktop Pub	£121
Clares ProArtisan	£82
Clares Artisan 2	£49

M/B 8 BIT SOFTWARE

Design 7 +	£8.60
Desfax	£17.40
Masterfax	£26.00
Mastercopy	£11.20

TELETEXT



THE MORLEY TELETEXT ADAPTER

BBC/Master	£104
Compact	£120
RML Nimbus	£104
Archimedes	£125
Optional PSU	£9.50



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THE ULTIMATE ADD-ON FOR ALL SERIOUS MASTER USERS

No more need to switch your computer off to insert a cartridge containing a required ROM.

With 2 cartridges and a ROM board, a staggering 32 ROM images installed and accessible at any time.

Allows an additional 8x16k and 4x32k ROMs to be installed in the Master and still leaves the cartridge slots free.

Master control ROM which includes a clever file transfer program allowing files to be transferred between DFS and ADFS formats or vice-versa. £40

MASTER SMART CARTRIDGE

Built-in features include:

- Freeze program at any point.
- Screen dump (any mode).
- Allows most protected software to be backed up including disc to tape and tape to disc. £30

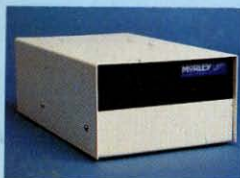
CARE MASTER CARTRIDGES

Dual 2 x 16k	£10
Quad 4 x 16k	£14
Dual 2 x 32k	£12

32K NON VOLATILE RAM
Cartridge (ideal for
Spellmaster Dictionary) £33

BBC / MASTER SCSI HARD DISC DRIVES

Don't be fooled by price, these units are among the fastest on the market.



Completely compatible with BBCs, B+s and Masters fitted with ADFS. Free utility disc incl: Format, Verify, Archive and Park.

20meg	£399
30meg	£449
40meg	£499
Larger Drives	POA

BBC / MASTER EPROM PROGRAMMER



The fastest, best value programmer in the market.

Totally software controlled.

Programmes 27128/2764/
27256 Eproms: 12 and 21
volt.

Includes full ROM
management software with
numerous features £30

Eprom utility disc. Put all
your favourite routines into
sideways ROM, both basic
and machine code. £5.25

BBC / MASTER DISC DRIVES

All drives are 40/80
switchable with TEAC
mechanisms

Single	£79
Dual	£169
Power supply	£40

Acorn

We are an Acorn dealer and service centre. If you would like to have a look at the A3000 or any other Acorn/Morley product please feel free to call in and discuss your requirements with our staff.

If there is anything you require which isn't advertised, please ring for a competitive quote.

How To Order....

BY POST: Enclose cheque made payable to MORLEY ELECTRONICS LTD.

BY PHONE: By quoting your ACCESS or VISA card number.

CARRIAGE: £1 on most orders. £3 on larger items. Hard Disks, Computers + Monitors £10 (carrier).

VAT: UK customers please add 17 1/2% to cost incl. carriage.

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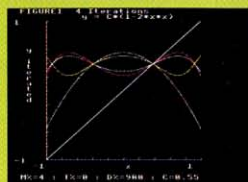
SPECIAL GRAPHICS ISSUE

Strange attractors in three dimensions and Chaos theory: The amazing new areas of Mathematics that everyone can explore. Join the ranks of technical drawing experts with Computer Aided Perspective Drawing and discover how the experts create sideways scrolling games screens in this very special graphics issue with something for everyone and every Acorn machine.

SPECIALS

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Chaos
Investigate the cutting edge of modern mathematical theory with three fascinating programs



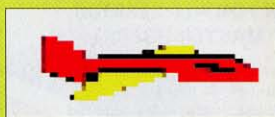
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In perspective
Draw in 3D with this computer-aided perspective drawing package for all Acorn machines.



83

Scrolling screens
Have you ever wondered how sideways scrolling works? Now you can find out, and try it yourself.



Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro.



All the major listings in this magazine are accompanied by checksums to help you key them in correctly.

Get it right ✓

For full details of how to use them see the article on page 56 of the February 1991 issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 88 to find just what you're looking for - from cheap modems to complete computer systems.

EDUCATION

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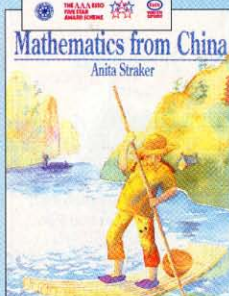
Update
Up-to-the-minute news of the Acorn range of micros in use in the world of education.



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Reviews
Catch up on the latest software for the BBC Micro series in schools, including:

- Mix & Match with Maggie
- Concept Designer
- ESSO Five Star
- Logo Activity Sheets
- Mathematics From China





Newcomers

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Arcade Game Creator

Produce your own great coin-op game without knowing how to program – can it really be that easy?



61

Graphics enhancer

Break out into the world of 16 bit colour with this stunning new add-on board – we explore what it can do.

63

Talking micros

We compare the quality and features of three speech synthesisers for the Archimedes and BBC A3000.

89

Strange attractors

In the final part of our series discover an infinite 3D line that never crosses itself.



97

Data encryption

Protect your data with the most sophisticated encoding technique available on a home micro.



THE MICRO USER

Three month's free reading!

That's what we are offering new subscribers. And that's not all. Month after month they'll receive free software from the latest issue.

This month for instance, all our subscribers will receive:

- The Revised 1AD to 9999AD Calendar
- Data Encryption Software
- Perspective drawing package
- Plus all type-in listings

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

- Virus Killer version 2.0
- Plus over 900k of PD software

For new subscribers there's a special gift: A free binder to keep your copies of *The Micro User*.

Find out how to subscribe on Page 104



Software SCENE 40

Our experts delve into what's among the latest games releases



NEXT THE MICRO USER IN

We bring you a totally unique sound sample player for the 8 bit BBC Micro, another way to scroll the your screen, how to use plotters and much more. Plus our PD section full of great money-saving ideas.



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Dabhand Computing Ltd, 5 Victoria Lane, Whitefield, Manchester M25 6AL. This advert was produced using Impression from Computer Concepts.

Archimedes Computers

A 3000 2Mb Ram	£599.00
A 3000 LC 2Mb Ram *....	£699.00
A 410/1	£1099.00
A 420/1 LC **	£1299.00
A 440/1	£1699.00
A 540	£2995.00

We can match or improve on prices advertised or quoted in or from this magazine please phone for the best deals.

We operate the Acorn Schools, Academics & Finance schemes.

* Pack includes PC Emulator, 1st Word Plus, Genesis. ** + Acorn DTP.

Oak SCSI Devices

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20 Mb Internal Hard Disc	£299
45 Mb Internal Hard Disc	£399
80 Mb Internal Hard Disc	£599
100 Mb Internal Hard Disc	£795
200 Mb Internal Hard Disc	£1195
20 Mb External Hard Disc	£349
45 Mb External Hard Disc	£449
80 Mb External Hard Disc	£649
100 Mb External Hard Disc	£845
200 Mb External Hard Disc	£1245
High Speed Range	
40 Mb Internal Hard Disc	£495
80 Mb Internal Hard Disc	£675
100 Mb Internal Hard Disc	£995
200 Mb Internal Hard Disc	£1545
45 Mb External Hard Disc	£685
80 Mb External Hard Disc	£865
100 Mb External Hard Disc	£1185
200 Mb External Hard Disc	£1735
60 Mb Tape Streamer	£795

Archimedes A400

5.25" Ext. floppy disc interface	£30
A 540 4Mb Ram Upgrade	£449
Additional 3.5" Floppy Disc	£119
ARM 3 Upgrade (30 MHz)	£449
ArVis S-VHS Video Cont. Board	£295
ArVis S-VHS Encoder Board	£145
ArVis Video Graphics Board	£877
Atomwide 8 Mb Memory Upgrade	£850
Chroma 345 Overlay Board	£389
Dongle Dangle (Impression/Oak)	£6
Econet Module	£46
Ethernet Expansion Card	£249
Floating Point Expansion Card	£449
Hawk V9 Video Digitiser	£339
I/O Expansion Card	£79
Keyboard Extender	£8
Midi Upgrade to I/O Exp. Card	£27
Midi Expansion Card	£65
Midi Upgrade Rom	£14
Mouse (New Style)	£40
Scanlight Junior Scanner A6 (CC)	£179
Scanlight Senior Scanner A4 (CC)	£389
Sheet Feeder for above A4 (CC)	£95
SCSI Expansion Card (Acorn)	£229
TCP/IP Ethernet	£199
VIDC Enhancer	£29

Dabhand 410/1 to 420/1

Acorn A410/1 upgraded to A420/1 specification using only the highest quality Samsung Ram and a 20 Mb Seagate ST-125-1 28ms drive or Acorn drive formatted and tested for guaranteed trouble free use.

A410/2 20 Mb	£1099
Colour System	£1289
Eizo 9060 SZ System	£1499

Dabhand 410/1 to 440/1

Acorn A410/1 upgraded to A440/1 specification using a Branded 40 Mb 28ms drive formatted and tested as above.

A440/1 specification	£1299
Colour System	£1488
Eizo 9060 SZ System	£1699

Dabhand ST506 Hard Disc Drives

Archimedes A410 Internal Hard Disc Drives for use with 'on-board' ST506 winchester controller. Comes complete with mounting chassis, screws, connecting cables and easy to follow fitting instructions.

20 Mb 28ms	£129
40 Mb 28ms	£245

A3000 SCSI Devices

Please refer to Oak External SCSI prices in the opposite column as prices for A3000 external units are the same.

A3000 Ram Upgrade

Atomwide Ram Upgrades	
1 Mb Ram Upgrade	£79
4Mb upgrade to above board	£130
4 Mb Ram Upgrade	£175

A3000 Upgrades

5.25" External floppy disc cable	£15
5.25" External f/disc buffer (Pres)	£46
5.25" External f/disc buffer (Beebug)	£39
Dust cover (Keyboard + Monitor)	£12
User & Analogue Podule	£46
Monitor Stand (Acorn)	£29
Monitor Stand (Pres)	£24
Mouse Extender (No more fiddling)	£8
Serial Upgrade	£19
Serial Link Kit (BBC-Arc)	£14
User & Midi Podule	£46
VIDC Enhancer	£29

A400 Series Ram Upgrades

Fast Samsung Ram complete with step by step fitting instructions.

1 Mb Ram	£50
2 Mb Ram	£95
3 Mb Ram	£140

Standard Monitors

Acorn Colour	£199
Microvitec Cub 3000	£199
Philips CM8833 II	£199
Philips Mono (Green)	£85

All monitors come with free lead. State type of computer when ordering.

Multiscan Monitors

EIZO 9060SZ Flexiscan	£399
EIZO 9070SZ Flexiscan ^	£599
Taxan 770+ LR Multivision .	£425
Taxan 795 Multivision ^ **....	£495
Taxan Viking II Mode 23	£799

^ comes with free VIDC enhancer.

** monitor has 0.26 dot pitch and Sony Trinitron tube.

Master 128

Master 128	£369
------------------	------

Floppy Disc Drives

5.25" Single 40/80 no psu	£95
5.25" Single 40/80 with psu	£109
5.25" Dual 40/80 no psu	£185
5.25" Dual 40/80 with psu	£199
3.5" Single with psu	£85
3.5" + 5.25" 40/80 no psu	£185
3.5" + 5.25" 40/80 with psu	£209

Printers

Citizen 120D+ (Serial add £20)	£129
Citizen Swift 9	£179
Star LC10	£139
STAR LC200 COLOUR (9 pin)	£199
CANON Bubblejet BJ-10e	£289
Canon Bubblejet BJ-130e	£449
Sheetfeeder for BJ-10e	£59
Citizen Swift 24	£249
Colour Kit for above (also Swift 9)	£39
STAR LC24 - 200	£239
STAR LC24 - 200 COLOUR	£289
Sheetfeeder for LC24 - 200	£69
Integrex Colourjet 132	£519
HP Paintjet	£795
LASER DIRECT (Qume)	£899
LASER DIRECT (LPB8 Hi Res.)	£1349

Midnight Graphics Products

Midnight Tracer

!Paint to !Draw conversion, turn your sprite files into fully editable object orientated draw files which can be scaled, rotated and manipulated without any loss of detail.

Ideal for users of all Desktop Publishing and Scanning packages. Accepts any sprite file and offers many image processing facilities. Translation can be colour or monochrome, includes a unique automatic tracing feature, variable trace options and curve fitting facilities.

The manual includes a user friendly tutorial with hints and tips on how to obtain the best results from your sprite files.

!Tracer is an ARM coded Risc OS multitasking application and will easily run on a 1Mb machine.

Midnight Tracer £52.13

Clip Art - Draw Files

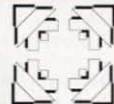
Give your DTP documents the right balance with Midnight Graphics Clip Art.

Over 480 Draw file images, presented in a library of five discs.

Change the images in !Draw to suit your style and purpose.

Then place them into Impression or Acorn DTP.

Clip Art . £29.95



Books (No Vat)

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Archimedes Assembly Language £14.95
Archimedes Operating System £14.95
The above books have accompanying discs add £5 for 5.25", £7 for 3.5"
A3000 Technical Guide £29.95
A540 Technical Guide £65.00
Acorn DTP Advanced U.G. £14.95
Archimedes First Ste, s £9.95

BASIC V: A Dabhand Guide £9.95
BBC Basic Guide (Acorn) £19.95
DTP Seeds (4Mation) £8.45
128 Ref. Man.Pts 1&2 (ea.) £14.95
New Advanced User Guide £19.95
RISCOS PRM's £79.00
Additional Arc Software Manuals (Acornsoft)
First Word Plus, DTP, Assembler . (ea.) £10
ANSI C Version 3 £19

Printer Drivers

Midnight Graphics
Citizen Swift 9 Sprite Dump £26.04
Citizen Swift 24 Sprite Dump £26.04
Epson 24 Sprite Dump £26.04
HP Paintjet Sprite Dump £26.04
Integrex 132 Sprite Dump £26.04
Integrex Colourcel Sprite Dump £26.04
Juki 5520 Sprite Dump £26.04
Star LC10 Sprite Dump £26.04

Star XB24 Sprite Dump £26.04
Star LC200 Sprite Dump £26.04
Star LC24-200 Sprite Dump £26.04
Ace Computing
Printer JX £13.00
Printer PJ £13.00
Printer CA £13.00
Electronic Font Foundry
BubbleJet - BJ10e/130e £10.00

Software

ANSI C V.3 Compiler + free C Guide £139.95
Apocalypse (3D Space Game) £14.95
Arc DFS (DFS Filing System) £24.95
Arcade Soccer £14.95
ArcTerm (Serial Port) £59.00
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CHOCKS AWAY 2 (Flight Simulator) £14.95
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Desktop Office (Minerva Integrated Package) £99.00
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REDSHIFT (Minerva scrolling arcade) £14.95
Render Bender (Clares) £59.95
RHAPSODY (Clares Music package) £34.95
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Superior Golf £14.95
STUDIO 24 PLUS (EMR New Risc Os Version) £149.00
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The Wimp Game (Desktop Adventure 4th Dim.) £14.95
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Twin World £14.95
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Available**

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Resource, Sherston, Widgit
And many more...



The Complete Upgrade Solution



- Uses only eight RAM devices
 - User upgradeable from 1 to 4 Mb
 - Four layer printed circuit board
 - Low power consumption
 - Available without RAM devices
- Bare card - \$35 2nd Mb - \$56 4th Mb - \$159**



- Includes MEMC1a upgrade
 - Large capacity OS ROM sockets
 - No soldering required
 - Four layer printed circuit boards
 - Courier collection of your machine
- 2nd Mb - \$225 4th Mb - \$299**



- 400 series RAM upgrade kits
 - Supplied with full fitting instructions
 - 410/1 to 420/1 requires 1Mb
 - 420/1 to 440/1 requires 2Mb
 - 410/1 to 440/1 requires 3Mb
- 1Mb - \$35 2Mb - \$65 3Mb - \$99**



- Uses only eight RAM devices
 - Suitable for A440, A400/1 & R140
 - Fully RISC OS compatible
 - Four layer printed circuit boards
 - Courier collection of your machine
- 8 Mb upgrade - \$749**



- New series Aleph One ARM3
 - 3 to 4 times performance increase
 - Surface mount technology
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 - Courier collection of your machine
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NEWS BEAT

Fonts fiddler foiled

EVEN great distances are no barrier when it comes to software developers protecting their products. When Mike Matson of educational software house 4Mation was tipped off that the fonts in his popular Poster package were being sold by an unauthorised dealer "in the southern hemisphere", he set a trap.

Through a third party he put in an order and obtained conclusive proof when he managed to buy back some of his own fonts.

He has since agreed to take no further action if the person concerned reimburses him.

"This highlights the problem which developers face on copyright and on stopping our belongings from being stolen", he told *The Micro User*.

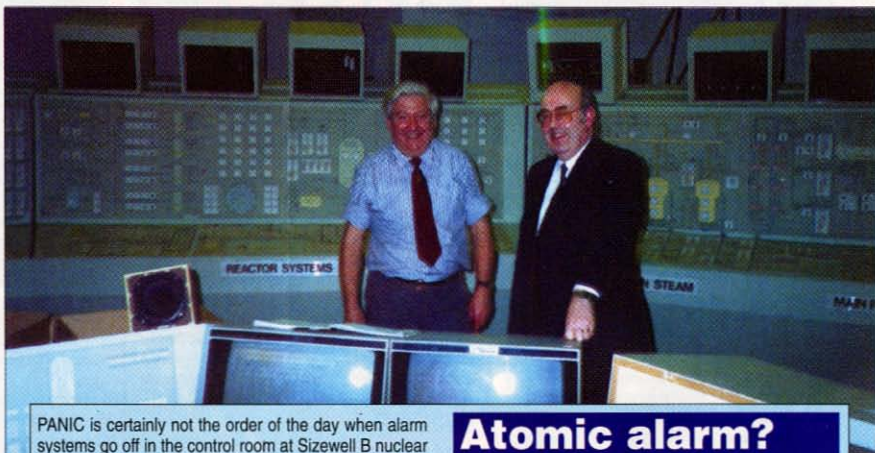
"Some people complain about the copyright screen in Poster, but we have to have some way of protecting ourselves while causing the minimum of inconvenience to the users.

"We discovered that this person had a font catalogue and some of the ones he was selling were those from our Poster package. We were also told that he was selling goods from Acorn, Longman Logotron, Computer Concepts and Beebug, and I have informed those companies.

"The silly thing about it was that he was selling our fonts for the equivalent of £8 each, which means that all 20 fonts would have cost twice the amount that the whole Poster package costs".

Crufts collection?

WHAT barks and appears in August? The answer is the next product from 4Mation. The company are keeping the package under wraps at present but we know that it includes a number of dog noises acquired from the extensive animal collection of Mike Beecher at EMR. Watch this space.



PANIC is certainly not the order of the day when alarm systems go off in the control room at Sizewell B nuclear power station, and that's partly due to an Archimedes computer.

The latest system changes the whole approach to alarms by replacing the normal shock tactics with musical sounds. Mike Beecher of Electromusic Research produced the computer generated sounds which are being installed into the system by GEC of Leicester.

"This is a government project so not too much can be said about it, but I created the original concept and produced the sounds using the EMR Sampler8 and SoundSynth sampling system for the Archimedes", he said.

"It will be used for fire alarms and operator alarms for the control room and other areas of the power station. It is low level so as not to give the staff heart attacks when it goes off".

Spokesman for Sizewell Len Green told *The Micro*

Atomic alarm? Don't panic - give us a kiss

User: "Our alarm systems are generally quite relaxing. We don't go in for wailing noises and hooters.

"Why subject operators to added stress when the object is just to draw their attention to something that needs looking at?

"You can wake someone up by either bursting a paper bag next to them or gently kissing them on the cheek. We go for the kissing method".

● Pictured inside the control room mock-up for Sizewell B nuclear power station are Mike Beecher of EMR and John Threader, GEC.

Economical X terminal from an Arc

A NEW software package has been launched to provide a low cost way of turning your Archimedes or BBC A3000 into an X terminal.

Called IX, it allows users to connect their machines to a network of Unix workstations running the industry standard X Windows system.

Developed by Gnome Computers in association with Acorn, it gives users access to the many applications running under X. If loaded into an A3000, for example, a colour X terminal can be set up for under £1,500.

The IX server can be configured to display X applications run from any type of remote workstation running X 11. It supports TCP/IP over both Ethernet and Econet networks, can provide simultaneous support for up to eight independent X screens and includes a high level of network security through DES encryption.

Users can toggle back and forth between the Risc OS DeskTop envi-

ronment and the X sessions while the X server continues to maintain its clients.

And Acorn's Arm processors mean that the speed with which applications can be managed by IX is greater than that delivered by many machines which are configured solely as X terminals or low-end workstations.

"The real potential of this application lies in areas where the user needs a multi-purpose system", said Acorn spokesman Brian Salter.

More details about IX from Gnome on 0480 406164. The software comes on a standard 3.5in floppy disc and costs £199.

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

RoboLOGO



This new extension to traditional LOGO, made possible only by the enormous computational power of the Archimedes, provides three dimensional control of an articulated humanoid or animal figure through the use of a standard LOGO language. Sophisticated natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure. This natural form of graphical response is readily understood by students using LOGO to learn the concepts of logic & reasoning. The traditional Turtlegraphics & 3D Glider features are also supported for easy transition to this innovative concept in natural response LOGO.

(RISC OS) **New**

REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed capability of a Realtime Graphics Language module to provide the fastest programmable animation facilities bringing any design to life from within your own programs. Facilities include 3D Rotate, Scale, Orbit, Perspective, Position & extensive display styles for wireframes, hidden-surface removal, smooth shading and multiple light sources with individual intensities.

(RISC OS) **New**

GATE ARRAY DESIGN SYSTEM

An introductory course for teaching Silicon Chip Design with facilities for Array design, Cell design, On-line Help and a tutorial on integrated circuit design. Ideal as a low cost teaching tool for engineers & students where expensive silicon fabrication facilities are not required.

(RISC OS) **New**

SOLIDTOOLS



The first fully integrated environment for 3D CAD, Photo-realistic rendering, Interactive animation, Programmable animation and high resolution hardcopy to printers and plotters taking designers to new heights of design productivity and performance exceeding the capabilities of 'heavy-weight' packages on PC-compatibles and workstations which cost considerably more. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your design and presentation requirements.

(RISC OS) **New**

SOLIDCAD

The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.

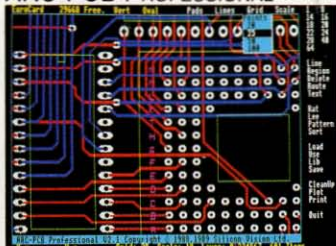
(RISC OS) **New**

FILM-MAKER

The package provides an interactive environment to create animated sequences of 3D scenes with dynamic camera motion for 'walk-throughs' and 'flight-paths' for objects within the scene. Fully compatible with SolidCAD for designs and SolidsRENDER for ray tracing, animation Oscars are now within your reach.

(RISC OS) **New**

ARC-PCB PROFESSIONAL



The ultimate PCB design package developed specifically for the Archimedes is now even better. ARC-PCB Professional follows on the success of the original and provides Faster & Improved Automatic Routing, Oval & Circular pads with fully variable sizes, Faster Redraw, Extended library part manipulation, & Instant Editing operations for substantially increased productivity. This Professional version operates orders of magnitude faster than the original and surpasses all other PC-based PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design. Take the lead for your PCB designs before your competitors do.

(RISC OS) **New**

SOLIDSRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations which take into account light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence.

(RISC OS) **New**

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC" - RISC USER Aug 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. My congratulations to Silicon Vision" - Archive June 1989.

"RiscBASIC wins the race...has the edge overall" - BBC Acorn User Nov 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

(RISC OS) **New**

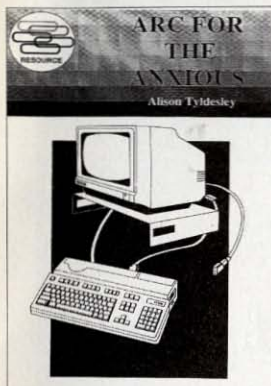
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Resourceful way with micro jargon

A NEW series of booklets from Resource (0302 340331) aims to cut the jargon out of teaching newcomers about computers.

Among the amusing titles which offer a sensible alternative to lengthy manuals are Arc for the Anxious and IT for the Terrified.

Arc for the Anxious has 31 pages of straightforward text and large clear diagrams for people who are just beginning to use a BBC A3000 or Archimedes.

It starts with a drawing of how to connect up the machine and continues with explanations of other hardware and two typical programs, Draw and Pendown. Other sections cover formatting, copying and some slightly technical aspects.

IT for the Terrified deals with the day to day things users might want to know about their BBC Micro, from connecting a printer to copying discs. Titles for both the anxious and the terrified cost £4.95 each.

Among the more general titles is a series of four booklets called Computers in the Early Years. They cover the basic problems which might occur with wordprocessing, data handling and problem solving.

Introduction and Text Handling each cost £4.40 with Information Handling and Problem Solving weighing in at £4.95. Bought together, the four cost £17.50.

On the educational front there is IT in the National Curriculum by Ian Birnbaum. It shows how to tackle assessment, curriculum analysis, staff training and much more. Price, £7.50.

Resource is a non-commercial organisation supported by the LEAs of Humberside and South Yorkshire.

Learning Curve leads to the wide blue yonder

THREE medical men have become flying doctors, courtesy of Acorn Computers Limited. They are among 13 prizewinners in the recent competition linked to Acorn's Test Flight promotion for its key product range, The Learning Curve.

Dr. Martin Shaw of Bournemouth has scooped first prize of a trip for two on Concorde in the promotion featured by *The Micro User*. He and his wife Marian will board the British Airways Concorde at Heathrow for a Mach 2 flight round the Bay of Biscay.

Their trip will include a champagne lunch and the chance to view Concorde's flight deck. They will also receive a special presentation pack to commemorate the occasion.

"I was very surprised but very pleased to have won such an exciting prize. We're really looking forward to the trip", he said.

"I had almost decided to buy a Learning Curve system and when I tried it out, my mind was made up. My children use it for games and educational programs and I use it in my work, both as a GP and as a medical advisor to local companies".

Dr. Henry Goodall of Basset, Southampton recently took off with The Flying Tigers at Goodwood Airfield when he won a week-end of light plane flying tuition.

After ground briefing both Dr. Goodall and his wife Wendy took the controls of a Cessna 152 Aerobat plane - one of the few aircraft licensed for aerobatics.

"Although I have done a bit of flying, it was many years ago", he said. "It was interesting to go up in the Cessna

152 which is a plane I have not flown in before. We went on a 15 mile circuit and although it was slightly hazy, visibility was good. It was a most enjoyable experience".

Third doctor to win an Acorn flight is Stephen Hiew of Enfield. He stayed at the Hilton National, Warwick with a friend, Mr. Kim Chan, for his light plane flying weekend with South Warwickshire Flying School at Wellesbourne Mountford Airfield.

"It was the first time that either of us have had the chance to fly a plane", said Dr. Hiew. "It was a new and very interesting experience, thanks to Acorn".

Schoolboy Gareth Moore of Farnborough has a real treat in store when he finishes his GCSE examinations in June. The 16-year-old will swap text books and exam papers for

enjoy two days of tuition and flying with Fast Helicopters at Thruxton Airfield, Andover.

"It's really something to look forward to because it comes just after I have finished my last GCSE", he said. "I have never been in a helicopter or in a plane because I always had a bit of a phobia about it but I seem to have overcome it now I have won this prize".

Also taking to the air at the controls of a Robinson R22 will be mechanical engineer Brian Readman of Walsingham, Cleveland. He will join Fast Helicopters for a week-end in July with his wife Veronica.

Winner of the third light plane flying weekend is Beebug customer S. Swain of Welwyn.

In addition to the various flights on offer, six Test Flight entrants also won Citizen Aerocron pilot watches, each worth £250. They were Tim Cook of Ickenham, Malcolm Pigott of Southport, David Watkins of Polegate, Edward Sands of Redhill, Malcolm Holt of Brighton and G.R. Fitch of Aylesbury. "The Test Flight project was just part of our growing assault on the leisure and home user sectors of the computer market", said Acorn's sales and marketing manager for consumer products Bob Coates.

"We find that potential new customers and those wanting to upgrade their machines are convinced by just seeing our computers in use. They speak for themselves. Test Flight was a way of getting them to look and as such, it was a great success. Our congratulations to all the winners".

More than 80 Acorn dealers throughout the UK took part in the Test Flight promotion.

Their customers were invited to try out The Learning Curve, which combines either a BBC A3000 or an Archimedes computer with a collection of wordprocessing and educational software.

The competition called for answers to a series of questions on The Learning Curve and gave entrants the chance to try out their flying skills on computer-based flight simulator Interdictor.



● Test Flight prizewinner Dr Henry Goodall receives a pre-flight briefing from instructor Jim Green

the controls of a Robinson R22 helicopter after his Test Flight win.

And his prize of a helicopter flying weekend for two will be even more exciting since it will be the first time Gareth has ever flown.

With his father, Graham, he will stay in the Hilton National, Newbury to

Digitiser deal agreed

CAMBRIDGESHIRE Software House (0480 67945) have acquired worldwide distribution rights to the Microeye 1A digitiser from Digithurst.

Digitising at 24 bits colour per pixel, it gives all ARM-based machines the facility to produce high quality colour images with a choice of 16.7 million possible colours.

Microeye 1A costs £395 plus VAT, and for a limited period CSH are throwing in a free copy of the Picture Book text and image database.

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PCB software updated

SILICON Vision (081-861 2173) have produced two new releases of their ARC-PCB software which harness the power of the Archimedes to the design of printed circuit boards and schematic drawings.

Providing more PCB layout features and schematic drawing capabilities, ARC-PCB Professional V3.1 now supports arc and circle drawing for silkscreen and general annotation, curved tracks for analogue design and free form tracks of any angle.

Other improvements include layer swap operations, scaling of components, rotatable text library, direct write to library directories for building custom library parts, an enhanced

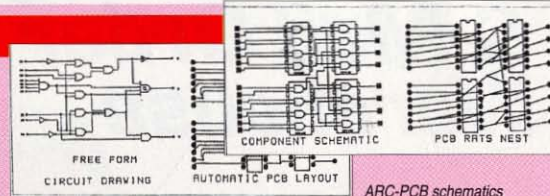
design rule-checker and improved printer and plotter drivers which handle arcs, circles and any-angle tracks.

To allow external editing with other Risc OS programs such as IDraw and DTP packages for professional presentation, the Drawfile format is also supported by V3.1.

This includes access to any Risc OS printer driver for producing artwork on laser, ink jet and wide carriage printers.

Silicon's top of the range package is ARC-PCB Schematics V4.1 which includes all the features of ARC-PCB Professional V3.1 plus schematic drawing capabilities.

Supporting free-form circuit drawing for design presentation, it also offers



ARC-PCB schematics

full component level schematics for automatic conversion to PCB rats nest layout.

It can be automatically routed or manually tracked as required and the reverse operation for ripping up tracks into a rats nest is also available.

ARC-PCB Professional V3.1 costs £375 for a single user and £1,875 for a site licence. Existing users of V2.1 can upgrade for £75 and those with V1.6 or

earlier pay £180.

ARC-PCB Schematics V4.1 costs £575 for single user or £2,875 for site licence. Existing users of PCB Professional versions 2.1 and 3.1 can upgrade for £200 and those with V1.6 or earlier pay £380. Original discs must be returned to Silicon Vision by users wanting to take advantage of special upgrade prices.

Archimedes checking the lie of the land

WHEN Alexander von Humbolt set out on his explorations in the 18th century, his aim was to find new lands. In the 20th century, his name has now been given to a hi-tech Archimedes-based system which analyses how the land is being used.

And, like its namesake, Alexander – the new remote sensing and geographical information system – is also becoming well travelled. It is currently on trial in a number of sites around the world.

The Alexander software allows users to study images remotely sensed from such sources as satellites or aircraft. With the help of Archimedes computers, these images can be used to analyse the use of terrain for agricultural or industrial purposes.

The necessary data is already provided by numerous satellites in a vari-

ety of spatial and spectral resolutions including Meteosat, NOAA, Landsat and SPOT.

Bath College of Higher Education has just installed seven Archimedes A540s with Alexander both as a research and a teaching facility. The system can also be found at Canterbury University in Christchurch, New Zealand and at Beijing University in China.

Interest in it has also come from Australia, India and Canada where the system is seen as having great potential for earth science research by local governments and project planning companies.

Alexander was developed over two years at the International Institute for Aerospace Survey and Earth Sciences at Enschede in the Netherlands under contract to the Beleidscmissie Remote Sensing

section of the Dutch government and with substantial help from Acorn Computers.

Its main advantage is its low cost and ease of use. Traditional remote sensing and geographical information systems normally include expensive software and dedicated computers.

They offer little opportunity for the hands-on experience needed by researchers and students to acquire skills in practical image processing, analysis and presentation.

Alexander is affordable by small institutions and has the advantage of being mouse-driven under the Archimedes Risc operating system.

It also allows work to be conducted on a whole set of images rather than just one at a time and these images can also be exported to other Risc OS applications.

"We are now engaged in a joint marketing approach with ITC, as we consider Alexander to have great potential for government and commercial customers both in the UK and around the world", said Acorn's value added solutions manager, Warwick Hirst.

Getting the right conception

REALISING the problems which some users may have with selecting the right Concept keyboard to interface with their computer, the Concept Keyboard Company have published a series of helpful leaflets.

Known as the How To leaflets, they are written in plain and practical terms, explaining the hardware requirements such as keyboard type and connection leads. A separate section deals with the range of software available and also gives details of suppliers.

"Concept keyboards are now available to interface via facilitating software with most popular computers on the market", said Paul Goddard of CKC. "As each computer manufacturer has different connection requirements, we believe it is important for users to understand exactly what is required in terms of hardware and software". More details of the free leaflets from Paul on 0962 843322.

Converting Midi data

VERSATILITY is the keynote of the latest developments from Electro-music Research, who have produced a series of Archimedes file converters which allow Studio24Plus and MicroStudio owners to use music files from various sources.

Their Midi File Format module is an icon bar application which allows Midi data from most professional music programs on other computers to be converted into EMR format. This includes the only other Midi program on the Archimedes, Rhapsody.

Studio24Plus can now receive Atari, IBM and Macintosh Midi data and can have 9,999 patterns in a piece.

The Maestro converter accepts files from Acorn's Maestro, removing unwanted data to produce an EMR format file directly from the icon bar converter.

A SoundTracker converter takes music data into the EMR format and EMR's equivalent program Rhythmbox similarly puts 8-track monophonic parts over. For prices, ring EMR on 0702 335747.

New colour printer driver

BEEBUG (0727 40303) have launched a Risc OS colour printer driver to go with Star Micronics' new range of colour printers.

Designed for all Star 9 and 24 pin machines – the LC10, LC200, LC24-200 and XB24-10 – it can also be used with all Epson-compatible dot matrix colour printers. Price, £17.63

Joy in Capri

CAPRI Marketing (0628 891022) have been appointed sole UK distributors of the Dynamics Comp Pro joystick for the BBC range. It costs £16.99.

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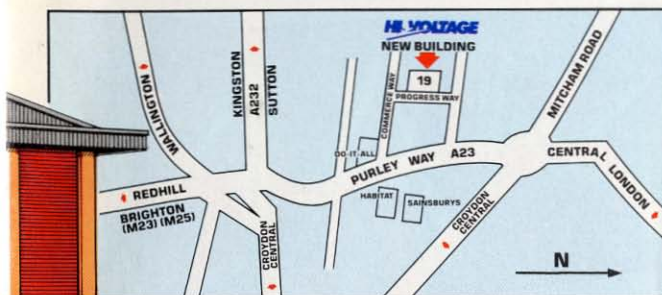
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MJ7



HAC MAN

Hac Man takes up the Castle Quest once more

Welcome to another column of all that's best in Acorn games.

In the August 1990 column I passed on a few hints and tips for Micro Power's arcade-adventure Castle Quest. One was that yes, it is necessary to get captured by the guards and go through the routine of escaping from the prison because you need the stool, which is located inside the prison cell.

There is no getting away from the fact that you do need the stool, but it has recently been pointed out to me by Dax Turner and Stevie Carter of Wraysbury, Middlesex that you can obtain the stool without deliberately offering yourself for imprisonment.

As usual, you must first acquire the sword by using the little figures to the left of your start position as spider fodder,

then make your way up the long slope towards the prison. Just before you reach the guard at the top of the slope you must jump at him with the sword in your hand. This should kill him, leaving the way clear for you to dispose of the other two guards in the usual way.

You can now walk unopposed into the prison, take the stool and make your exit the way you came in.

Incidentally, Dax and Stevie's method of jumping at a guard as you go to fight him works well in almost all situations because you can often kill the guard with one strike instead of having to engage in the usual battle.

However, this does not work if there is brickwork or another such obstacle above your head, because you have no space in which to make your leap. Nevertheless, it is a technique worth mastering because the wizard's castle does not give up its secrets easily.

Power pills

- Castle Quest short cut
- Overdrive pokes revisited
- Infinite energy in Citadel
- Zarch cheat mode updated
- Conqueror capers
- Apocalypse level jump

The stool's a steal!

Overdrive suffers from clutch slip

Whoops! It's fix-the-buggy time again. In the April 1990 column I featured a routine for the original cassette version of **Overdrive** to allow you to select your start level and the number of cars you must pass in order to be promoted to the next level.

In the July 1990 column I featured a modification to this listing so that it could be used with the versions of Overdrive featured on the Superior Collection Volume 2. However, Steven Rangeley of Rochdale has pointed out to me a glitch in this modified listing of which I was previously unaware. My

original listing of the April routine contained a line 230 which contained two pokes of the form ?&xxxx=x, but by the time it was committed to paper line 230 had become lines 230 and 235, each with one poke.

To make the original listing Superior Collection-compatible both lines 220 and 230 needed to be modified, but I had reckoned without the rogue line 235. However, the fix is very simple – just delete line 235, re-save the modified listing and type RUN to give yourself complete control over the racetracks of the world.

Thank you Stephen.

Elk Citadel

In the May issue I provided infinite energy routines for the versions of Stryker's Run found on the 5.25in and 3.5in Play It Again Sam disc versions for the Electron.

Now it is the turn of another game from the same package that keeps generating fan mail in this column when in the normal course of time it should have disappeared quietly into the mists of computer game history.

The game in question is **Citadel**, my favourite of the four on the first Sam collection, and the two routines provide infinite energy on the two disc versions of Citadel.

As before, type in the routine appropriate to your disc system, then save it on to one of your own blank discs – NOT on to the original Sam disc – then type RUN and follow the on-screen instructions.

```

10 REM Citadel infinite energy
20 REM Acorn Electron Play It
Again Sam 5.25" disc version
30 REM by Hac-Man 1991
40 REM (C) The Micro User
50 REM
60 oscli=8FFF7
70 FOR IX=0 TO 2 STEP 2:PX=890
O:COPT IX
80 LDH# cli MOD 256 : LDH# cli
DIV 256 : JSR oscli
90 LDA# 860 : STA 8A99 : JSR 8A
A00
100 LDA# 0 : STA 84048 : STA 84

```

Listing 1: Citadel infinite energy for 5.25in Sam 1

```

10 REM Citadel infinite energy
20 REM Acorn Electron Play It
Again Sam 3.5" disc version
30 REM by Hac-Man 1991
40 REM (C) The Micro User
50 REM
60 oscli=8FFF7
70 FOR IX=0 TO 2 STEP 2:PX=890
O:COPT IX
80 LDH# cli MOD 256 : LDH# cli
DIV 256 : JSR oscli
90 LDA# 0 : STA 84048 : STA 84
30F : STA 84565 : STA 84634 : STA

```

Listing 11: Citadel infinite energy for 3.5in Sam 1



32-bit fun

Paul Tasker of Leamington Spa has written to me to ask for hints with three Archimedes games, **Zarch**, **Conqueror** and **Apocalypse**. Well Paul, I featured a piece about Zarch's cheat mode in my June 1988 column, but three years later it seems appropriate to repeat it.

The cheat allows you to increase your number of lives at will, re-fuel in mid-air and activate an automatic pilot.

To start, load **Zarch** as normal. Stay on the launch pad and fire to make sure that the sound is on. If it is not, press S to switch it on.

Now place one finger over each of the keys Q, T and U. Press Q and then quickly press T and U together. To see if it has worked, press D to activate automatic pilot. If it hasn't, switch the sound back on and try again – it does work.

Once the cheat mode is in operation press D to engage or disengage automatic pilot, L to increase your number of lives by one, and F to re-fuel. Any or all of these features can be used at any time.

The following hints on **Conqueror** come, so to speak, directly from the horse's mouth – Jonathan Griffiths, the author of the game. Over to Jonathan:

● German tanks have a poorer hill-climbing ability than either the American or Russian ones. This means that if you are playing German, a good tactic is to sit at the top of hills, from where you can rush down at

opponents. Conversely, if you are playing Allies, a good idea is to run away in the direction of the steepest hill, as this will slow down any pursuit.

● The program calculates the angle of incidence of any shot fired at a tank, and uses this to calculate the effective armour. Thus an oblique shot at a tank will have more armour to penetrate than a square-on shot.

So if you are being shot at, try to ensure that the enemy shot strikes at an angle and when you are shooting try to attack the enemy tank at 90 degrees to its armour plating.

● Front armour is best on all tanks, so present this to an enemy at all times. Equally, try for the enemy's flank or rear when firing back.

● A sensible tactic – as employed by the micro – is to form heavy tanks into groups and leave the light tanks to reconnoitre. This means that the light tanks – which can travel faster and thus run away as well – act as the eyes of your force.

The standard tactic of the light tanks when under auto-driver is to run away from anything they cannot shoot. Consequently they make ideal scouts, as they will just report any sighting, and it is then up to the player to direct a nearby group of heavy tanks to deal with the situation.

● When using map fire don't forget that the shells take about 30 seconds to hit the ground, so try to predict where the enemy forces will be at that time and place your fire accordingly.

Note that computer-controlled tanks do not look for map fire, so you must stay clear of the target area until you are sure that all the shells have landed.

● Try to balance your force when choosing tanks. Light ones are useful for reconnaissance, and also as an

emergency reserve. Heavy tanks are good at slogging it out with the enemy.

Medium tanks combine the virtues of both the light and heavy tanks, but are generally lacking in both speed and firepower.

● The various tanks have individual strong points, and a good player will be able to use each sort to its best advantage.

American

Chaffee: Very fast and cheap.

M36 GMC: Also very fast, and with a good gun, but no real armour.

Sherman Firefly: Good gun, with medium speed and armour.

Pershing: Same gun as M36, good armour and medium speed.

German

Panzer III: Very cheap, but not very good at any one thing.

Panther: Excellent frontal armour, good gun and average mobility. Beware that both side and rear armour are weak.

Tiger I: Excellent all-round armour and good gun.

King Tiger: Best armour and gun of any tank, but slow.

Russian:

T34/76: Good all-round armour (in common with other Russian tanks), good speed and average gun.

KV1S: Better armour than T34/76, same gun.

KV85: As KV1S, but with a better gun.

JSII: Excellent armour and gun, good mobility.

● Don't forget to use your drone tanks. Direct one to hold an enemy

tank's attention, while driving your tank to its rear and then shooting.

However, you should note that the computer tank has two objectives – to defend itself, and to shoot any player-controlled tanks. Thus it will turn its frontal armour towards the most powerful gun, and it will shoot at the lightest-armoured player tank.

On to **Apocalypse:** Gordon Key, the author, tells me that the game features a cheat which allows you – from any point – to jump to the next planet.

To activate it, quickly type in ELIZA with even key presses. You will receive the message ESCAPE SEQUENCE INITIATED followed by 3 PERIODS TO ESCAPE. You will then see the messages LLANERK SELF DESTRUCT SEQUENCE INITIATED and 1 PERIOD TO ESCAPE.

As long as you survive these last few seconds you will receive the message ESCAPE IN PROGRESS and will be presented to the Royal Guild of Spacing.

There the female member of the Guild panel will say to you "Very well done" in a suitably regal tone of voice. Your status is increased accordingly, and you are allocated another planet.

Note that using this level jump means that you have in effect completed that planet, so the status flag on the disc that indicates that a particular planet has been sterilised is then permanently set.

Consequently, if you really want to, you can jump to each of the planets in turn so that every time thereafter that you come to play **Apocalypse** all the planets will be available to you.

However, to my mind there seems little point in doing this, because if you cannot master one particular planet you will be unlikely to cope with a more difficult one.

```
30F : STA &4565 : STA &4634 : STA
&5BE1 : STA &5CDB : \ infinite e
nergy
110 JMP &60FF
120 .cli EQU "LOAD CITALK"+CHR
$(13)
130 J:NEXT
140 PRINT"Please insert Sam dis
c and press any key...";:FX 15,0
150 AZ=GET:KEYO *LOAD CITADEL|
M PAGE=&1000|M END|M OLD|M 470 CA
LL &900:END|M RUN|M
160 *INIT
170 VDU 21:FX 138,0,128
```

```
&5BE1 : STA &5CDB : \ infinite e
nergy
110 JMP &60FF
120 .cli EQU "LOAD CITALK"+CHR
$(13)
130 J:NEXT
140 PRINT"Please insert Sam dis
c and press any key...";:FX 15,0
150 AZ=GET:"MOUNT
150 *KEYO *LOAD CITADEL|M 470 C
ALL &900:END|M RUN|M
160 *FX 138,0,128
```





FEATURE

JULY is seen as the silly season by newspapers because nothing of any note usually happens during the summer months. Well, this last month has been more chaotic than silly due to the number of fractals and Mandelbröts which have made their way to my desk.

Most people admire fractals and then turn to something more practical. However, they are being used to generate clothing and poster designs and are significantly more intricate on PCs and Apple Macintoshes than they are at present on the Acorn front.

Mike Curnow from AFG – the Archimedes Fractal Group – aims to change that.

AFG is a new PD library and as the name suggests they deal only with fractals. They aim to pool the skills and talents of those in the Archimedes world and by research and sharing software routines hope to extend individual capabilities and explore new areas of fractal geometry.

Two Desktop/multi-tasking programs Julia and Mbrot are included on this month's disc along with the rather clever AFGSprite. This utility allows sprites to be manipulated and converted from !Paint format.

It simply allows the parameters used to create a sprite to be stored in a sprite file. Using Modes 13 and 15 you can edit the sprite variables changing the type between integer, basic floating point, double floating point and so on.

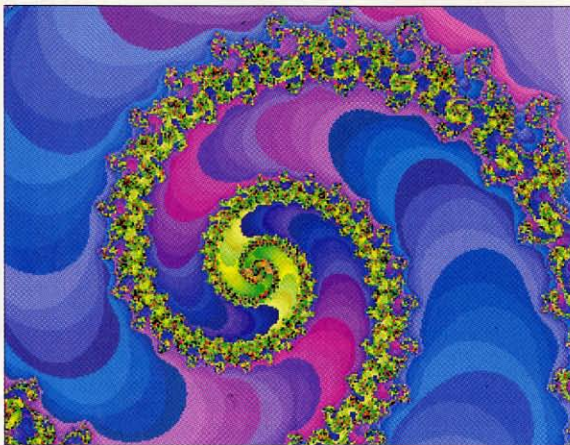
You can also add some very nice effects such as changing the colours to give a colour shift effect, and you can even animate your creation. There is a lot of potential here and exciting results can be achieved using fractal theory. If you have never tried the water before, the AFG may be just the place to start.

Fun and games

Bored with the normal arrow which represents your mouse onscreen? Then change it.

Swinger will give it a disorientated feel as it will point in a variety of directions while still being usable. But **Pointer3** will let you customise to your heart's content.

The standard is a pointing hand but to make this more individual use !Paint to edit the sprite in the sprite file



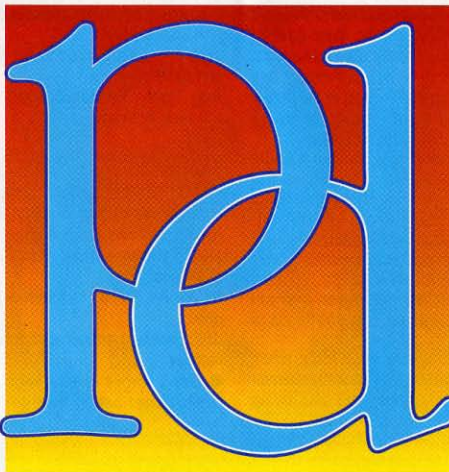
Fractal magic

!Pointer3.Pointer. You can redefine the colours and change MS1 and MS2 in the default desktop palette – do remember to save your changes to the palette under !Pointer3.Palette though.

To join the Duck, Troll and other

itinerants jogging along my Desktop I've added !Cel-Van. It's a little red van with the logo CEL which potters along happily.

From the same source came !Door. Once you boot this, any file you open will be accompanied by an atmo-



Teri Paul examines this month's selection of PD goodies from the latest in Mandelbröts to a friendly clock

Chaotic ramblings

spheric creaking door sound.

Remember Wanda and Sharks? Well for the less nautical there is now **Planes**. You've guessed it, a selection of little aircraft appear and disappear from behind your windows on the Desktop.

Unsaintly Patience

One game I go back to again and again is the Patience provided on the Applications Discs. If you haven't the patience to keep on playing until luck allows you to win, or perhaps you just want to impress your friends, there is a version of Patience with cheat modes. Now you can put any card in a space – not just Kings – and/or change how the cards are revealed.

A brand new release that's just landed is perhaps the silliest idea I've ever seen: PacMan running in a window on the Desktop. I know we want a full multi-tasking environment but this is really silly. However, it's very well programmed with absolutely smooth animation, though running a tad slow, and includes a pause facility and high scores.

The variety of different kinds of clocks available for the Archimedes never ceases to amaze me. Rik's Rough Clock is one which appeals. Rather than giving you the exact time it lets you know that "It's almost 20 past 11".

This is really only as exact as I need and as the clock only assesses the system once a minute it saves on processor time. You can also edit the template to change the position of the window and the colours.

On the Desktop

Placelt is a utility which goes one step further in copying the workings of the Apple Mac Desktop environment. Anyone familiar with this computer will know that you can take any file or application from a disc and pop it on the Desktop and then run it, leave it there or pop it on another disc at a later date. Placelt is not quite as resilient as the Apple facility, but it's getting there.

Updated versions of FileUtils, HelpReader – which now compresses, tests and creates RunMe applications – and VKiller arrived here recently and these will be passed on through the monthly disc too. There



are also some other useful bits and pieces I have only just come across.

Westbourne PD recently sent me a file recovery utility, **!Recover**, which effectively rescues defective sectors. Simply take your file to the **!Recover** icon on the icon bar and "save as..."

If you are someone who moves files around on one disc then **!CopyOps** could well be of help. Load this utility and two radio buttons – labelled Copy and Move – appear on the left-hand side of the icon bar.

The Copy option uses the normal Desktop operations when you move/copy a file, but by choosing Move, files are renamed where possible instead of copied. This saves you having to wait for files to be loaded and saved because it renames the file even if you drag the file icon and don't hold down the Shift key.

Summer funds

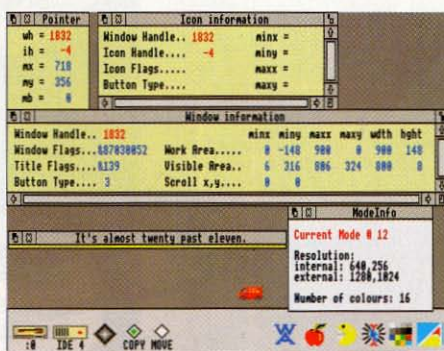
It is the season of summer sun and holidays and if you need to know just how many dollars you're going to need for your vacation then load up **!XChanger**. If you enter the exchange

rate this little program calculates how much a certain sum is in dollars or sterling. It also converts figures to hexadecimal and binary.

Ram discs are incredibly useful, but can be trying as they do tend to trap memory. **RamCram** allows you to alter the size of a ram disc when it has files in it. For instance, should you have 20k of files in a 200k ram disc there is 180k which could be used by other applications.

After booting **RamCram** a window appears which includes a strip indicating free memory like the ones used in the Task Manager. You change the amount of free memory by moving the strip. However, **RamCram** must have at least as much free memory as the ram disc has used up in files. If the application can't find enough free memory you'll be told.

If you use a variety of wordprocessors **!stFile** is worthy of mention. It's not a new application and is now in version 2.0, but you can change the file format of **FirstWord** files to text/ASCII format or from text and **WordWise+** formats. Simply drag the file you want to change to the icon bar and choose your option from the win-



Lot's of interesting things this month

dow. Simple! There is a minimum allowed file length of 110 bytes.

And finally, you could be forgiven for thinking that **WimpAid** is a charity – but it isn't. It's a wimp monitor utility. Giving you information about the pointer, windows and icons you assess it by clicking on the icon bar to reveal a menu with seven options. These include the x/y co-ordinates of the pointer, an SWI index giving the page number in the **Programmers' Reference Manual** where you can find more information, and a pause option.

More Archimedes PD libraries

Arch Angel, 9 Chancel Court, Chancel Lane, Pinhoe, Exeter Devon EX4 8QE

Archimedes Fractal Group, 30 Bowen Drive, West Dulwich, London SE21 8PN

Westbourne Services, Westbourne House, 34 Bradley Street, Wotton-under-Edge, Gloucester GL12 7AR

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ALPS



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Creator



Creator is a complete easy-to-use arcade game designer that runs in the Desktop on the Archimedes and A3000 to bring professional games techniques to everyone. You can design arcade adventures, change screens when you want or create scrolling shoot-em-ups – the choice is yours. Supplied on two disks, including the designer, run-time system, sampled sounds, tunes, sprite library and demonstration games and comes with a 50 page User Guide

- Animated sprites • Screen designer • Flight paths
- Attack waves • Parallax scrolling • Sound effects
- Background music • Scrolling stars • RISC OS compliant
- No royalties to pay

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Also available: ALPS Support Disc - provides text and graphics compression for **ALPS**: crams more text into memory and allows more pictures on disc. **£19.95**. (**£15.95** if bought with **ALPS**)

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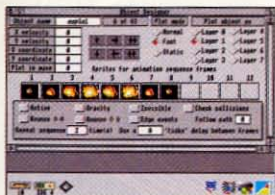
Product: Creator, Arcade Games Designer
Price: £38.95
Supplier: Alpine Software,
P.O.Box25,Portadown,
Craigavon BT635UT.
Tel:0762342510
Requirements: BBC A3000 or
Archimedes series

MANY moons ago Alpine Software produced an adventure games creator for the 8 bit BBC Micro. It allowed you to design rooms and verbs, with little programs that controlled different events as they occurred. For the Archimedes and BBC A3000 they have upped the tempo and produced a program that let's you design your own arcade games.

The packaging is a simple video-style box, 50 page manual for version 1.00 and two discs. The version I received was 1.04 and there was a five page release note on some additions to the software. The manual has an adequate contents listing but no index at all.

Most recent releases of commercial software written in C contain a utility called !SysMerge from Acorn that will upgrade your Clib version to the very latest Clib 3.66. Unfortunately there are a couple of pieces of software that don't like Clib 3.66, and there's a menu bug to go with it, however this doesn't generally interfere with using it and if you read the instructions carefully you'll find out whether the problems will affect you.

Disc one contains all you need to get started, and the manual contains a simple tutorial which will guide you through the initial steps of creating a Break-out game. My only complaint



Designing objects is easy



Selecting another path for editing

Zing! Zap! Blam!

Geoff Brown explores an easy way to mass destruction

here is that this tutorial is too terse covering only four pages and there's just too much data crammed in. A beginner would have to take it very slowly to really understand what's going on.

It is possible to just sit down at your machine and start work, with the manual close by your side. But to produce a decent game you will have to do some serious design work, sketching out your ideas, screen layouts, types of sprites, what each object does and how it interacts with the other objects and so on.

The Creator is completely window-based and typing at the keyboard is kept to a minimum. Double-clicking the space-invader file icon brings up the same little chap on the icon bar, as you would expect. Clicking with Select or Adjust here does absolutely nothing, you have to enter the extensive icon bar menu to bring up one or more of the various editing windows.

To create a new game you have to select one of two standard game skeletons, imaginatively called !RunGameA and !RunGameB. The latter has a scoreboard area at the bottom of the screen and can scroll the top while the first scrolls the entire screen.

You then need to put an alphabet

file - several are provided - and sprite file you've designed yourself into the !RunGame directory you've chosen as most appropriate for your creation. There's a character editing utility supplied so that you can design your own character set.

At this stage you're ready to begin the actual design process so drag the sprite file on to the Creator icon, bring up the icon menu, move up to Design and take a look at your options:

The Objects window controls the initial state of each object, it's velocity, position, how it's plotted, what sprites to use for the animation sequence and how fast to run the animation, what path it should follow, if any, where to plot it in a wave of baddies, again if any, and whether it's visible. Plus how the object should respond to gravity and the edges of the screen.

These options might seem confusing but they add up to all the different ways objects are handled in all the different types of arcade game you can play.

All objects can be specified as being on one of eight different layers, zero being at the back. This controls which objects are in front of others.

At least one object needs to exist and have a sprite attached to it otherwise an error message will be gener-

ated when you run a test. However this certainly isn't a problem as there's no point in testing it if there are no objects.

Next up on the Design sub-menu is Screen. Here you can put together a set of sprites that will compose a layer of the screen. The layers of the screen can be scrolled independently for parallax or special effects and an object on layer three will pass behind a sprite on screen layer four.

Many arcade games, particularly the shoot'em ups, have the sprites following defined paths and the Path option on the Design sub-menu allows you to set up any number of these for your objects to fly along. All you have to do is start clicking along the screen, making sure the points you create are not too far apart. Points can be deleted or new ones inserted, and existing ones can be dragged to new positions.

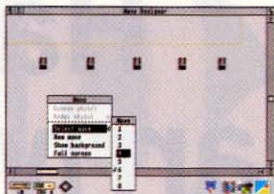
One other interesting feature is that the objects don't all have to be on the same layer so you can have the situation where a number of objects following one path can pass in front of or behind a screen sprite.

The Wave editing window is interesting: The idea of waves is pretty common, the waves of attackers in classic Space Invaders for example. But in Creator it's a bit different, a wave is just a way of gathering a number of objects together and treating them as a group. They don't have to be the same type of object and they don't have to move the same way - you could have ten objects in a wave, all looking different and all following different paths.

The significant feature is that they can all be started off or stopped at the same moment with a single instruction.



Create your own sound effects



Preparing a wave of rockets



The Event Manager has many options



Playing a demo game



tion, all hidden or made visible.

Additionally the position of each object in the wave can be shifted by the same amount – which would be very useful for Space Invaders. The final option is to attach a wave to a path in one smooth operation, the objects can be placed along the path at any spacing interval.

The most important window, and hence the most complicated, is the *Event* editor. As the game progresses events are produced: Objects colliding, objects reaching the end of their animation sequence or the end of their path, keys are pressed, built-in timers expire and variables have their values changed.

When an event occurs a list of possible situations is scanned and if that situation has occurred a number of actions are executed. For example, a bullet collides with a type 1 alien. The list of object-object situations is examined to see if the *bullet hitting type 1 alien* occurrence is catered for.

If it is the associated actions may be carried out, perhaps: De-activate the bullet, replace the alien with an explosion object, make the appropriate

sound, add 20 to the score.

General situations of *AnyObject* events can also be catered for. These are useful as a catch-all in case you've forgotten something. It is possible to cut and paste the list of actions although this is not a very versatile option – but it does speed things up.

The final *Sound* allows you to give names to particular sound effects which controls the sound used, which channel it comes out on, the volume, pitch, duration and stereo position. The resulting effects can be generated via an action in an event window.

Music can also be played by the system although it needs to be written by a music editor which is not yet available from Alpine. It's being written by Peter Gillett who's provided a lot of good tunes for arcade favourites on the Archimedes.

As a final point Alpine have not inflicted any nasty licensing agreements on the buyer. If you have Creator you can write and sell your game without any interference, but if you do write one Alpine would like first refusal on marketing it.

Overall this is an excellent piece of software, a bit rough round the edges

but certainly capable of producing good quality games. Some examples are provided in the form of the Break-out and, on the second disc, a sideways scrolling shoot-em up that shows how waves and paths can be used.



Waves can move very fast

Summing up

Creator is a very thorough piece of work and while one or two options I thought of were missing a quick call to Alpine showed they were a simple oversight and could be included very quickly and easily.

If you want to write arcade games but don't want to bother with the trivia of programming, then this is definitely the package for you.

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Desktop Folio

Has arrived!

Aid for Kuwait

THE director of The Advisory Unit for Microtechnology in Education, Mike Aston, is playing a major role in helping Kuwaiti authorities rebuild their education system which was destroyed by the Iraqi invasion.

He is one of a team of educationalists currently in Kuwait City to assess the problems, help in the initial regeneration of the country's schools and to come up with a five year plan for the future.

Mike's brief is to mastermind the development of Kuwait's information technology resources. Other team members will deal with teacher training and general curriculum matters.

Until August, 1990, Kuwaiti educationalists led the way in introducing computer education into schools in the Gulf.

Their computer education resources were completely destroyed in the Iraqi invasion and they now face the daunting task of starting from scratch.

Just before the invasion the first two year phase of introducing computing into the Kuwaiti curriculum had been completed and a National Project

Centre opened in Kuwait City. It housed a collection of British software and other computer education resources together with an in-service teacher training facility.

"During the Iraqi occupation, all Kuwaiti schools were ransacked and their computers either smashed or loaded into lorries and taken to Baghdad - in many cases mistaken for TV sets", Mike told *The Micro User*.

"The National Project Centre was completely gutted and all resources plundered. Computers worth just under £1 million were taken from the schools.

"Desks and other equipment were piled up and set on fire but fortunately the fabric of the buildings was left largely intact. The Kuwaitis hope to have children back in the schools by September.

"They want to produce a scheme for the next five years, to put computers firmly on their education map both for schools and for the university".

Mike is well suited for helping in the task because he was a member of the international team which originally evaluated the National Project Centre scheme before the invasion.

"The last time I was there was pre-

invasion", he said, shortly before flying out. "It will no doubt be a shock to see the devastation which has happened since. The job will also be less pleasant because it is a bit of a "no go" month when even if the weather is normal, temperatures are likely to be 130 degrees. We may be glad of the smoke from burning oil rigs which may blot out some of the sun".

Based in Hatfield and part of Hertfordshire County Council, the Advisory Unit gives technical support to teachers using computers in

schools. It has worked with the British Council in many countries overseas, helping them to develop their computer education facilities.

Children's book

ARCHIMEDES and BBC A3000 computers have combined with Longman Logotron's PenDown word processor and the talents of a class of 12-year-olds to produce a 64 page anthology

Integrating IT

WHILE the National Curriculum lays down precise specifics for its 10 statutory subjects, complications creep in with cross-curricular skills such as Information Technology.

IT must be delivered as an integral part of all the statutory subjects to pupils aged from 5 to 16 and an Archimedes-based program has now been produced to make the task easier for teachers.

IMapIT from HM Associates (091-384 1874) is a Genesis II application which acts as a quick reference point allowing teachers to examine the contribution that IT can make, not only to individual subjects but also on a whole school

Information Technology

A Curriculum Map



W.L.R. Hume & P.H. Macdonald

A Curriculum Map for Information Technology in English

Communications Summary

	Eng	Math	Sci	Tech	Art	Music	P.E.	S.E.
Level 1								
Level 2								
Level 3								
Level 4								
Level 5								
Level 6								
Level 7								
Level 8								
Level 9								
Level 10								

basis. In IMapIT, HM Associates have produced their own interpretation of how IT should be integrated and have based it around an easily understood colour coding system.

But they have also included the facility for teachers to change the

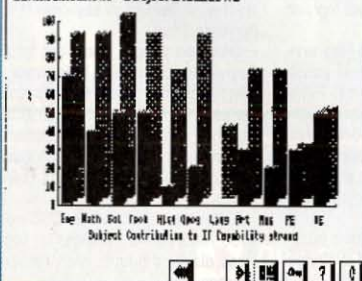
analysis to suit their own schools.

IMapIT runs under the Genesis II browser which is distributed with it, so Genesis II is not needed to make use of the application. It is needed, however, for teachers who want to make any significant alterations.

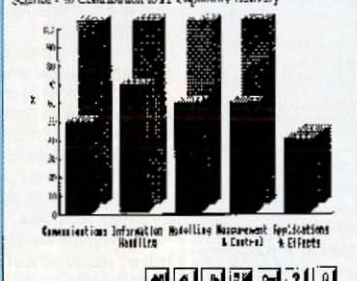
It will run on a 1Mb Archimedes but the developers recommend a 2Mb system for more effective results.

IMapIT costs £32 but special prices can be negotiated for bulk purchases and LEA licences.

Communications - Subject Breakdown



Science - % Contribution to IT Capability Delivery



Information Technology in English

	C	IT	M	PE	SE
Level 1					
Level 2					
Level 3					
Level 4					
Level 5					
Level 6					
Level 7					
Level 8					
Level 9					
Level 10					



of stories and other writing.

Called Lit by Keyboard, it is one of the results of an unusual "writing week" project held for year eight pupils at Parkside Community College in Cambridge which brought writers, children and educationalists in close contact with the computer industry.

Some children wrote stories for younger children and created dossiers about them in German. Others created campaign material connected with threats to the global environment.

The idea was formed when pupils gathered material for their stories but wanted them to look more like real

Lit by Keyboard



books. Cambridgeshire's inspectors and advisory teachers were keen to see how computers can assist in writing and called for the help of the industry.

Eastern Arts sponsored professional writers to go into schools, Acorn Computers loaned 10 machines to the college and Longman Logotron gave a site licence for PenDown to be used.

They also provided professional design advice and paid for the complete production costs of Lit By Keyboard.

After all the material was prepared, a small editorial group of pupils edited the word processed files into the book which is an excellent example of what children can produce when given the proper resources.

School Email link

THE educational benefits of electronic mail are being investigated with a new system believed to be the first of its kind in a British school.

Norfolk School-Net runs on an Archimedes computer using ARCbbs software at Eaton School. It provides an online, inter-school link between all Norfolk schools and there are plans to extend it further afield.

"Any school in the country interested in on-line communications is welcome to log on and become involved in this investigation of the educational possibilities of such a system", said its originator, Paul Welbank of Eaton School's IT Department. "We would also welcome calls from schools in Europe and beyond".

The Email and bulletin board system is considered to be an improvement on the viewdata systems run by many schools.

"Viewdata systems are too limited for the purposes we have in mind", said Paul. "They are excellent for colourful presentations and advertising but are not capable of presenting or transferring substantial quantities of information. Nor do they provide a proper electronic mail function."

"The system we have set up is not far behind Telecom Gold in terms of its

IoM Workshop

THE prestigious Rutherford Appleton Laboratory have now issued more details on their IoM Workshop recently announced in *The Micro User*.

To be held at the University of Oxford Computer Teaching Centre from July 7 to 9, it will give delegates in the education field an insight into new teaching software, paying particular attention to programs for BBC Micros.

The education level is sixth form in secondary schools and early years of

tertiary education, whether in a college of further or higher education, a polytechnic or a university.

"It will be useful for science teachers and area science advisors, particularly those looking for ideas on the teaching of the National Curriculum", said organiser Kate Crennell. "The recently IoM Schools Disc will be available for exploration".

Accommodation is available and delegates wishing to attend the workshop can ring 0235 821900, extension 6397 for further details.

Email facilities and is capable of handling hundreds of users around the county's schools. It is also open to the general public and has several regular users in the local area".

One of the main innovations of School-Net (also known as Star-Net) is the inclusion of an on-line database from which pupils can read or capture textual information on a variety of subjects.

They can also make their own contributions as information providers. Organisers are in the process of building the database and have capacity for up to 47Mb of data.

Software used is flexible enough to allow the system to act as a general purpose data gateway between schools and with outside organisations. Private and public user groups can be set up between groups with similar interests or people involved in specific tasks. Currently, links are being established with French and German schools, between schools transferring text and digitised images for DTP newspaper production and between primary and secondary schools.

Access to the system is by the normal Email method of computer, modem and telephone line. The facility is of particular use for contact with or between teachers.

As Paul says: "Try ringing a teacher during the school day! The advantage of our system is that he or she can receive a message, read it and reply at a convenient time".

Through its bulletin board, the system carries a wide selection of public messages on various topics. Files such as homework, letters, worksheets and National Curriculum documents can be uploaded and downloaded and School-Net are also building an extensive library of public domain software for various computers.

Any schools wanting further information should contact Paul Welbank on 0603 54015.

Helping hand

PEOPLE with learning difficulties and disabilities will reap the benefits of a new Special Access Pack launched by Acorn Computers for their BBC A3000 - now the fourth best selling computer in the UK.

Intended as a foundation system for the disabled, it includes an A3000 fitted with an Acorn serial upgrade as well as a Morley user/analogue upgrade for alternative devices such as Concept Keyboards, touchscreens and switches.

With an optional monitor and stand available, the pack also contains a utilities disc with a number of programs for users with visual or motor-related impairments.

One program emulates the movements of a computer mouse using the numeric keypad; a switch access program allows users with motor difficulties to type in data via a special switch input.

A screen window can be set to various magnification sizes, allowing users to set the size of screen print to suit themselves. A further program allows the input of text characters from a selection panel and there is also a flashing carat with a homing device to make it easier to locate the carat within a document. The pack comes with an overview booklet and a Special Needs Computing Handbook compiled by Northwest Semcer in association with the Ace centres.

Disabled people who work for the Papworth Group of Industries in Cambridgeshire assembled and tested the pack for Acorn and it was officially launched at the Naidex 91 exhibition of equipment and services for the elderly and disabled at Manchester's G-Mex centre.

Full price of the pack is £795 but a £100 reduction is available for registered disabled people and registered charities.

Weather module

A NEW module is being developed for Weather Reporter, the popular automatic weather station produced jointly by the Advisory Unit for Micro-technology in Education and Aardware Technical Services.

Easily installed on the outside cabling of the station, it will allow schools to record pressure, humidity and dewpoint in addition to the existing facilities of Weather Reporter.

Now a firm educational favourite, Weather Reporter is fitted on to the roof or outside wall of a building to record weather features such as rain-fall, wind direction and temperature.

Data is passed to an inbuilt processor and can be easily downloaded into

a BBC Micro or Archimedes. Software included in the kit allows it to be output in a variety of forms for classroom analysis.

Featured in The Times Educational Supplement, the kit recently received another accolade. It received a Silver Award at the Geographical Association Conference in Manchester where it was recognised as "an original item of equipment that should make an important contribution to remote sensing and weather interpretation".

The new module should be available from The Advisory Unit (0707 265443) by September. A complete Weather Reporter kit costs £299.

**Summer
price cuts!**
See page 31

ideA

The *ideA* range of hard disc upgrades is being welcomed as the best way forward for Archimedes and A3000 users. "IDE is the small-computer drive standard for the future," says RISC User. "ST506 is on the way out; SCSI has only a limited future in the small drive market."

PERFORMANCE

IDE is the only true 16-bit hard disc system currently available for Archimedes computers. All data transfers are 16-bit all the way from the disc, through the interface, to the computer (except that the A3000 internal interface has an 8-bit link to the computer).

FLEXIBILITY

An *ideA* system can turn your A3000 into a 20, 40 or 60 Mb workstation with no external attachments, using hard discs which sleep quietly during periods of inactivity.

The *ideA* system caters for two low profile hard discs in the same internal or external housing, allowing you to build up your capacity in easy stages without wasting money.

Then there's the *ideA* 'hard card' option - a 2½-inch hard disc on a standard podule.

VALUE

We think *ideA* upgrades offer the best value for your money, and we aim to keep it that way. Advanced IDE disc technology means simpler, cheaper, more reliable interfaces. Manufacturers' prices for hard discs fall gradually, and we pass these savings on to you as soon as we can.

Our upgrade prices include controller cards and fans where needed. Our disc cases are of metal construction.

RELIABILITY

The first *ideA* customers have been using the system successfully since last year. The A3000 internal hard disc is particularly reliable - not one has had to be returned to us.

The latest IDE discs are ruggedly designed with lap-top and portable computers in mind. You'll wait a long time to see a defect! A skilled service team is ready to back up our guarantee should the need ever arise.

COMPATIBILITY

The Micro User reported "no difficulty in running all fully RISC OS applications". Our IDE filing system is no different from ADFS in use, though it has a few extra features such as the facility to write-protect a hard disc. DOS partitions can be created for the PC Emulator.

CONTINUED SUPPORT

The coming months will see the introduction of many new IDE products, including tape streamers and removable discs. You may rest assured that our software and hardware will keep pace with these developments. Updates for existing users, if they ever become necessary, will be simple and cheap.

"A beautiful solution," said BBC Acorn User. Study our special summer price list on page 31, and let us solve your storage problems too.

Be in at the beginning!

**Quick
Key**

Do you have trouble remembering what twelve function keys do, with and without Shift and Ctrl, in twenty different applications?

Do you enjoy watching PipeDream insert a column when you thought you were saving an Impression document?

Up to now the best way to organise function key strips was with one of our Arckeys.

From now on you may never look at a function key strip again.

QuickKey shows 36 function key combinations on your screen. All at the same time, using the minimum of screen space, even in mode 12. You can choose any of these (plus Ctrl A, Ctrl B etc) using only the mouse.

QuickKey knows which application is waiting for input and will show you the appropriate function key definitions - automatically!

No more mis-directed key presses, because you can see what you're going to do before you do it. QuickKey costs only £10 + VAT and comes with a range of popular definitions (including Edit), to which you can easily add your own.

You only have to lift your finger!

**Other products
too good to miss!**

See page 31 for full price list



TWO (Task and Window Organiser)

Do you wish you could start applications, display directories, and open files all in one go? With TWO you can.

Do you wish your pupils were able to start work without understanding the Desktop? With TWO they will be.

Do you wish there was an easy way to tidy up your screen and find that buried window? With TWO there is.

TWO is far more than a 'sticky backdrop'. Its easy-to-use features make the Desktop a friendlier environment and will really save you time.

DrawBender

DrawBender distorts Draw files to follow a shape of your choice. A useful addition or inexpensive alternative to other graphics software, supplied with these **three** decorative fonts.

DrawBender is simple and enjoyable to use, with no complex menu structures. The example above uses DrawBender with **FontFX** - the two make ideal companions.

AnDi Oddule

Baildon Electronics Oddules open the way to cheap, flexible and almost unlimited external expansion via the I²C bus already supported by RISC OS. Baildon are producing a range of Oddules which may be daisy-chained.

Ready now is the **AnDi Oddule**. It has eight digital I/O channels with high current open collector drivers, four A/D inputs, and one D/A output. AnDi is capable of emulating user and joystick ports, allowing ADVAL operation from BASIC, and the use of Concept Keyboards and analogue or digital joysticks.

Cross-32 Meta-Assembler

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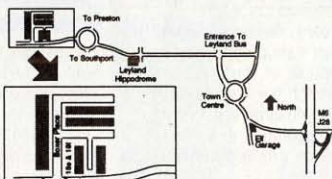
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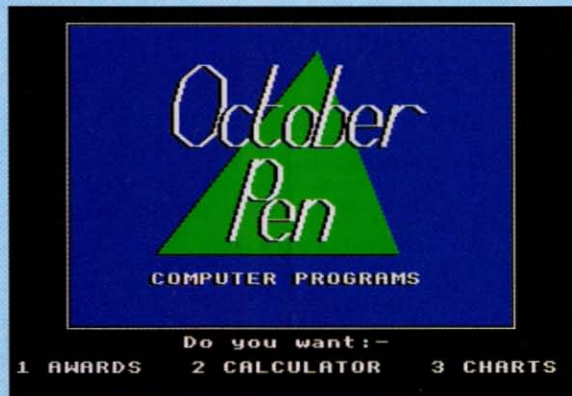
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Limbering



TWO major schools athletics schemes are the IBM Ten Step for primary children and the Amateur Athletic Association ESSO Five Star Award Scheme for secondary. BBC Micro programs to support virtually all the administration and recording needs of these schemes have been available since 1986, and now the equivalent Archimedes packages have been released.

These programs will hold records for up to 2,000 pupils as well as the software on a single working copy of the program disk.

This contributes significantly to the user friendliness of the program. Indeed the whole thing is very easy to use for those totally unfamiliar with computers as they are menu-driven with clear instructions given in the manuals.

If you are familiar with either scheme the software will virtually explain itself from the menu headings. Do check with the manuals first though, as there are a couple of annoying inconsistencies.

For instance, if you choose a number from a menu you'll have to follow this by pressing Return, yet some questions require only a single letter press and no Return.

These programs may not be state of the art, and mostly work in Mode 7 with some rather untidy screens from time to time, but they are functional and easy to use. I would have liked to have seen a safeguard or warning against creating a new file with the same name as an existing one.

I also found it a shame that there is no way to extend the size of the class once the original class size has been defined.

This is a common problem with databases and one easily avoided by making sure that you always start with a class size bigger than you think you need.

Each time you create a new file you're told how much space it'll need on disk as well as how much is available. A nice touch this, although the figures can appear a little confusing.

Both programs let you see what files there are though you can't access the list when you are trying to load a file. Fortunately the rou-

Easy access to turtle power

Product: Logo Activity Sheets
Price: £12 + VAT
Supplier: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LT.
Tel: 0223 323656

Phil Tayler takes a close look at some new help for Logo users

THE introduction of Logo into schools a few years ago resulted in a few very keen users, several dabblers and a lot of confused teachers who were not at all sure how to make a start.

Many books have been published, but most failed to provide a really simple introduction to Logo's turtle graphics.

Some teachers will have made their own materials, perhaps to run courses for colleagues, but Longman Logotron have come up with a durable and low-cost alternative.

The packs consists of 21 photocopyable activity sheets with teacher's notes. It is suitable for both BBC Micro and Archimedes although a few cards are specific to one or the

other. The authors have designed the cards for children aged 10 to 14 - although I would move each of those to a year younger. If you don't photocopy these cards the fact that they are laminated makes them very durable.

The style, aimed at the novice user, is clear and consistent. The turtles are cute enough to appeal to children while the clarity of the information will reassure the teacher.

The first card, **Getting Started**, gives excellent instruction for loading Logo regardless of the machine. When they reach the final cards in the series the children are loading and saving procedures and picture files as well as printing out their work.

As they progress through the cards they will cover colours, building procedures, parameters and

using the editor. The teacher's book is superb. There are suggested extension exercises plus background information including how to integrate Logo within a thematic approach.

Links are made here with National Curriculum Attainment Targets as appropriate.

Summing up

Experienced users will find little new material in the pack, although it could still be a useful resource for children. Novice users, guided by the National Curriculum, will find these materials a very sound and effective investment. Heartily recommended.

up



times for finding individual children are more helpful, requiring only the first few letters of a name for the software to offer suitable choices for the complete name.

Entering information is very easy. You are prompted for the appropriate data and you can alter it as often as needed. The programs warn if the result you are trying to enter is too low to be recorded.

While the Ten Steps program politely points out that some results are rather optimistic, the ESSO Five Star program was positively rude in its response to very good results – a feature that I felt was unnecessary.

Both programs have scoring calculators which do not affect any of the stored data. They allow you quickly to discover what your performance is worth in terms of points.

The Five Star software was again rudely hostile when I entered my sex with a lower case rather than an upper case M. Even novice programmers can produce code that recognises m or M as being the same, and this program's error messages are unnecessarily abrupt.

Summing up

While winning no awards for software design, these programs are functional, reliable, easy to use and inexpensive. However, I do find some of the error messages objectionable. Not only are they unnecessary, but in the context of school use, unprofessional.

*Marshal
Anderson joins
Puff and Anita
Straker in the
land of
inscrutable
wisdom*

Product: Mathematics from China
Price: £17.50
Supplier: ESM, Abbeygate House,
East Road, Cambridge CB11DB.
Tel: 0223 65445
Requirements: BBC B, Master and
Puff software

MOST decent educational packages these days provide some sort of support materials. If you're lucky the documentation will also direct you to other sources, but more recently software publishers themselves have been coming up with further extension work – usually in the form of photocopy masters to buy as an extra to the software.

Some excellent examples of this are the additional support materials available for the L game, Teddy Bears' Picnic and Topoligika's extra problem disk for Giant Killer.

ESM have now produced a support book by Anita Straker to go with her Puff adventure for lower juniors. If you have the original Puff program – published as part of the MEP study packs before ESM's involvement – the program is almost identical, so this book is equally relevant to you.

The 55 page ringbound booklet's theme is maths(ish) with Eastern overtones, and the activities fit into the National Curriculum document from level two to seven.

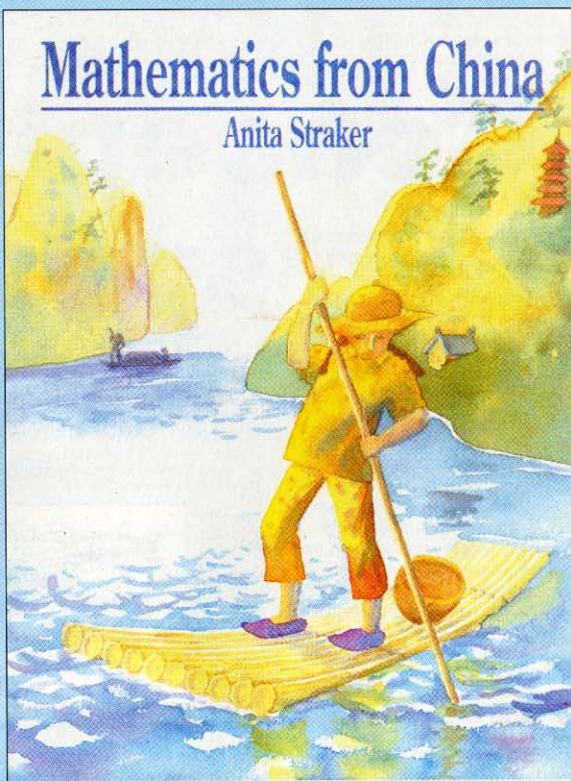
A concise introductory section goes through the worksheets under themes like numbers, the Chinese calendar, designs, games and the ubiquitous tangrams, plus a couple of recipes that you won't find at your local take-away.

You can work through either by level as they are arranged on the

Full of Eastern promise

Mathematics from China

Anita Straker



contents page, or by topic as they are arranged in the actual book.

What's noticeable is that very few of the activities are maths dressed up to make it interesting. These are real examples of numbers in action, and the tasks are mostly meaningful in themselves.

As well as poetry to read and lanterns to make, there's a short guide to creating Chinese-style paintings plus plenty of games divided into strategy and luck.

Summing up

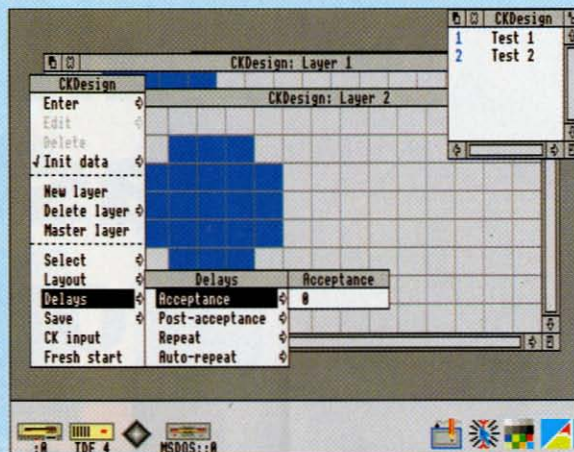
There's enough here to keep a class busy for half a term, and the material is organised so that you'll be able to apply the activities easily to a mixed ability group. The worksheets are photocopyable with clear instructions needing a minimum of preparation work before using them alongside the Puff program or without it.

It is an excellent resource for any junior classroom showing how activities on the computer are only a part of any project.



*Rog Frost
discovers a new
way to make the
most of your
Concept
Keyboard*

Product: Concept designer
Price: £24.00 + VAT
Supplier: Longman Logotron, Dales
Brewery, Gwydir Street,
Cambridge CB1 2LJ
Tel: 0223 323656
Requirements: BBC A3000 or
Archimedes range



Conceptually speaking

THE Concept Keyboard has been an essential add-on for schools for many a year. Basically, it's a board either A3 or A4 in size containing 128 touch switches.

Each switch can be programmed individually or in blocks to perform a single task. Usually you'll find a piece of paper – an overlay – on the Concept Keyboard to indicate what different areas will do.

For instance, an overlay may feature pictures which when pressed enter the appropriate word on the screen. This is often of great benefit to the young or handicapped – or anyone who has problems with motor control.

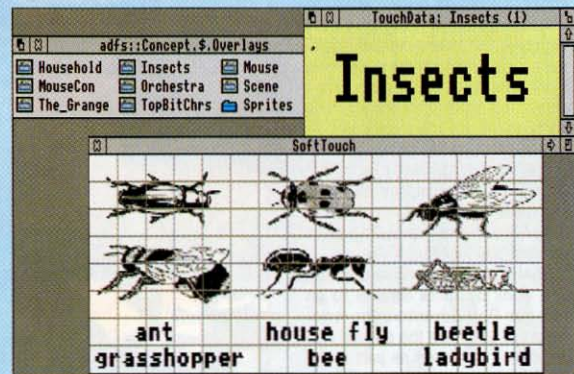
Now that the newer Archimedes machines are becoming standard in schools it was only a matter of time before they were accompanied by the Concept Keyboard.

The multi-tasking Risc OS environment makes the device an ideal one for customising many standard programs to be suitable for younger users.

The problem with using these keyboards lies in the programming. Most teachers do not have the time to bother acquiring the necessary programming skills no matter how useful they concede the keyboard to be.

Enter Longman Logotron and the Concept Designer, a suite of software aimed to make programming easy, help is also given with designing the overlays.

Heart of the system is !CKDriver



which allows Concept Keyboard input to be used with any Risc OS program that accepts text. For instance, while writing this review I use the phrase Concept Keyboard frequently.

Rather than typing it each time, I can include it by simply pressing the relevant part of the Concept Keyboard. No in-depth computer knowledge or skill is needed.

Programming is carried out once !CKDesign is loaded. Two windows appear onscreen, one a simple text editor and the other a representation of the touch switches.

Moving the mouse over this graphic while holding down the select

key on your mouse will mark an area of the keyboard – an individual switch or all 128.

Text can then be entered into the wordprocessor and stored on those marked switches. A wordprocessor is supplied with !CK Design, but !Edit, Pendown or most other packages will do just as well. Your only constraint is the the software must be able to save work as a plain text/Ascii file.

In addition you can also program specific keys, such as Return, Delete, Print and so on, on to the Concept Keyboard.

The manual is admirable and explanations are given in a simple

and straightforward manner.

The entire programming process is quick and simple and any teacher with the smallest amount of computer knowledge will be able to master the task in short order.

Of course people may wish to develop applications away from a Concept Keyboard. After all, you do need a user port to access the keyboard and it's unlikely that every computer will have one. !SoftTouch provides the solution by using an imitation Concept Keyboard on screen.

You access it by clicking via the mouse and this very clever idea is made even more useful by the ability to alter the display size.

The program requires a mere 16k of memory as does !CKDriver. This means that these programs can remain in memory with all but the most greedy of applications. !SoftTouch can also be used to create a sprite to fit the window. This can then be printed as a paper overlay.

The final part of the package is !TouchData, which allows you to display large text or sprite-type pictures. Rather than the text being set to another program, !TouchData takes control of the information and displays it in the fonts and sizes you have chosen.

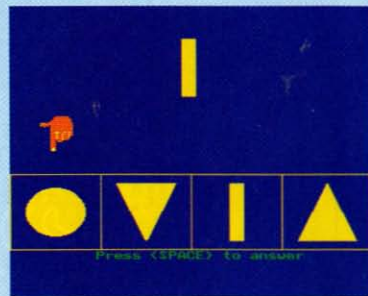
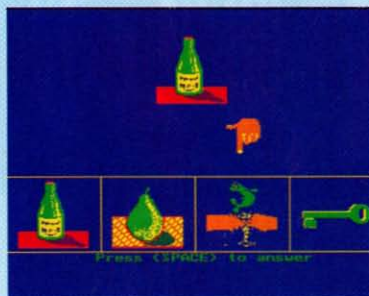
You'll find a good selection of resource files in the package. Eight sample overlays are available on disc and paper overlays in the manual. A collection of skeleton files in !Draw format contains blank overlays which can be printed out and artistic touches added.

There are two especially useful sprite overlays for !SoftTouch. One with awkward accented letters is ideal for foreign language study and another allows the Concept Keyboard to emulate the usual mouse actions. All in all a useful bank of possible uses.

In addition Logotron have included a collection of text files giving detailed help if you want to write large application programs. Aimed to encourage all programmers to follow the same protocols it's fascinating but something the ordinary user can avoid.

Summing up

A first rate package which will make it easy to use the Concept Keyboard with most good Archimedes software. It is an inexpensive and easy to use way to make the most of a Concept Keyboard. Strongly recommended.



Mixed bag of tricks

Evaluating three programs designed for the Archimedes and the PC Emulator – Marshal Anderson reports

SCETLANDER have a fair range of educational software for the BBC Micro and more recently have developed a new set of programs for IBM PC-compatible machines. Three have just been tweaked so that they will operate under the PC emulator on the Archimedes.

Mix and Match works at a pre-reading level looking at some basic skills. Recognition, visual discrimination and short-term memory are dealt with in three different activities.

As you begin you meet Big Maggie who will ask your name. Maggie is a sort of Loch Ness monster and is part of the theme throughout the package.

The games are chosen from a pictorial menu using the spacebar and Return key. The first section, Two of a Kind, is sub-divided into six. In Pictures a single picture appears at the top of the screen and four along the bottom. A pointing finger moves along the bottom set and you press the spacebar when the two pictures match.

Should you choose wrongly a cross is drawn through the incorrect picture and the program indicates the correct

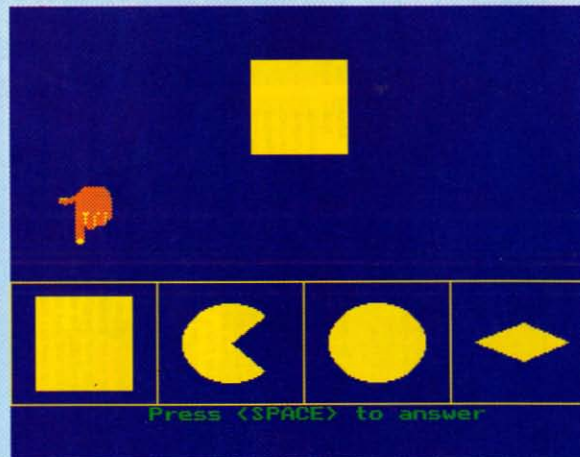
choice. You then get to try again. At the end of the game – which can run up to 10 questions – a row of smiling and sad faces appear to show how you did and where help is needed.

The procedure is identical for the options of shapes, upper and lower case letters and numbers – that is the shapes of the figures, rather than any

attempt at counting.

Next comes Same. Taking the skills a little further by showing an object in four different rotations of 90 degrees you are now looking for a more subtle match.

This is a nice extension task, but it appears third on a page of six tasks. A better position would be as the final



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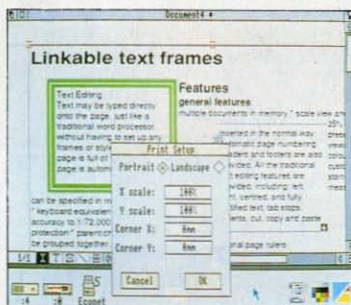
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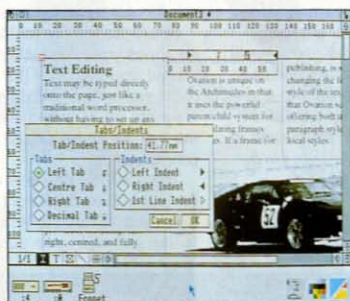
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Please write or phone for a brochure. This advert was produced entirely using Ovation.

WE looked last month at an interface board using the I²C bus connector from your Archimedes. Now I would like to go into the various operation modes of which the board is capable.

To recap, the interface board consists of two chips, the PCF8574 an 8 bit digital I/O and the PCF8591 analogue interface.

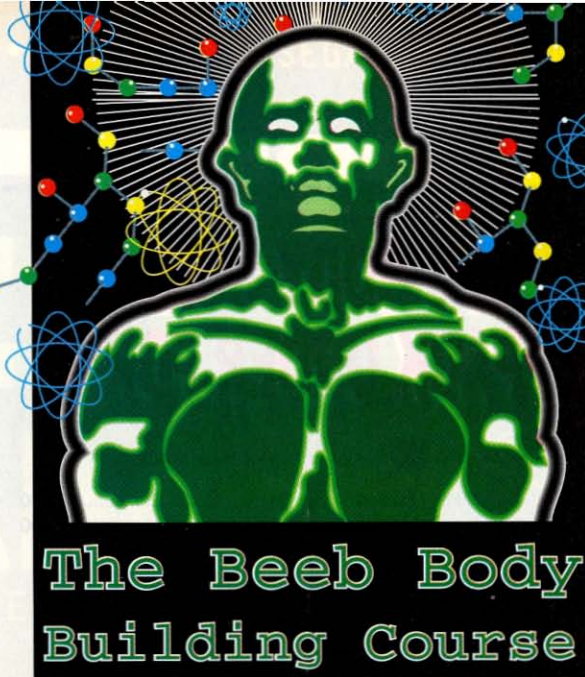
The digital side is quite straightforward, as we saw last month. It consists of a single register. Write to it and you change the bits, read it and you get the logic levels on the lines. Unlike the User Port, there is no data direction register.

This means that the bits can act as inputs and outputs at the same time. This is achieved by having an internal, weak pull-up resistor so that a logic 0 output is a hard output but a logic 1 output can easily be pulled down by any driving device. The only thing you had to do was make sure that you sent logic 1's to the bits you were using as inputs.

The analogue side, however, is much more complicated and can operate in a very flexible manner. Figure 1 shows the block diagram of the input/output side of the PCF8591.

You will see that, as a device that boasts four analogue inputs and one analogue output, it only has one digital to analogue converter. This device, as we shall see, works overtime to produce all these functions.

Just like the analogue input port on the Model B and the Archimedes I/O module, this device has an analogue



Operating the interface

*Part 3 of Mike Cook's
I²C bus adventure*

input multiplexer – just a fancy way of saying a four way switch! Any one of the input lines can be switched to the next stage of the circuit a *Sample and Hold* block.

This is, in effect, an analogue memory device. Whenever it is told to

sample the input it holds that voltage on its output until it makes another sample.

This is important here, since it means that the input voltage does not have to be stable while the analogue to digital conversion is taking place,

thus allowing quickly changing voltages to be measured with little error.

The output of the sample and hold is taken to a comparator – a circuit that gives a digital 1 or 0 depending upon which of its two inputs are at the higher voltage. The other input, as you see, is taken from the output of the digital to analogue converter.

What the *successive approximation* logic does is to play a guessing game with the system. The unknown voltage from the sample and hold is compared with a known voltage from the digital to analogue converter. By adjusting the known voltage you can match it to the unknown one.

This works like the high-low number game: One person thinks of a number and the other tries to guess it, each guess being greeted with the response high or low.

The best way to play this is to guess initially at a half way point, then you half the range again until you home in on the answer. Thus you make repeated successive approximations. In our case, after eight guesses the logic has the value worked out and sends the answer back to us.

While all that is going on you might be forgiven for thinking that you couldn't use the analogue output. However, there is a further sample and hold circuit buffering the analogue output.

This means that you can set the analogue output and it will stay fixed while the D/A goes through its gymnastic routine.

Normally, a sample and hold wouldn't hold its voltage indefinitely, it

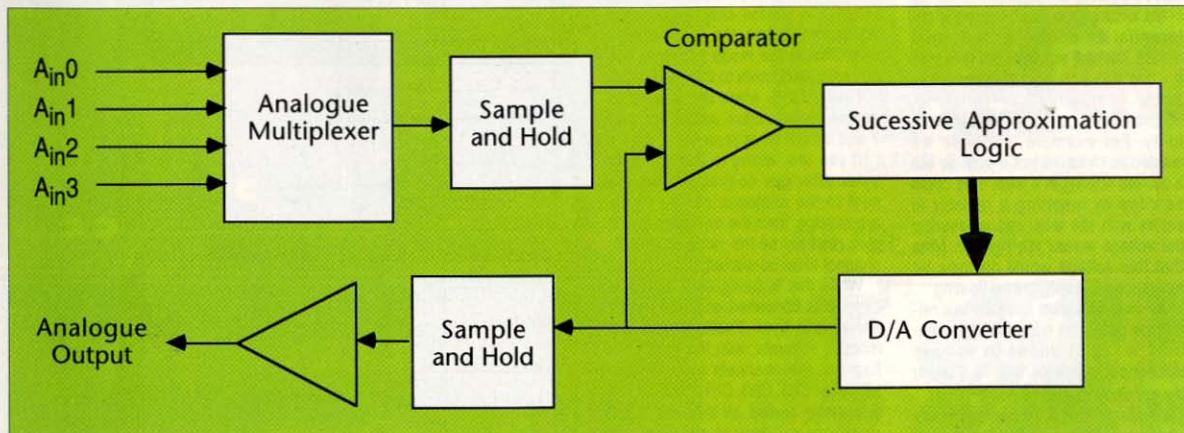


Figure 1: Block diagram of PCF8591



suffers from what is known as *hold droop* – honest. However the PCF8591 keeps a track of the value you last sent it and keeps refreshing that value between A/D conversion cycles.

All this complexity does not slow the device – it can operate and convert samples as fast as the I²C bus can operate, so there is no need to see if it is busy before giving it a command.

As if that were not enough, the input to the A/D is capable of being configured in four different ways or modes, as shown in Figure 11.

The lines labelled A_{in} are the analogue inputs to the multiplexer while those labelled Channel are the lines that are converted. The mode numbers are shown in binary so that, as we shall see later, it is easy to use them.

Mode 00 is the simplest, where the A/D conversion is performed on the input lines. This is what happens on the joystick port of the older computer. We say this is a single ended input because the voltage is measured between this line and earth.

In contrast, look at Mode 11. Here we have only two different channels but each has two inputs which go to a differential amplifier with a gain of one. This means that the voltage presented to the A/D converter is the difference between the two input voltages. If these voltages were the same the output would be zero.

You will see that A_{in0} is labelled + and A_{in1} is -. This means that if A_{in1} is the higher of the two voltages the digital result will be a negative number. So while the inputs can only go between zero and 5 volts, the difference between these two voltages can be positive or negative.

So what use is this? Having a differential or double ended input means that the voltages we measure do not have to be referenced to earth.

This allows us much greater flexibility. For example, suppose we wanted to measure not a voltage but a current flowing in a wire. This could be done by inserting a resistor in series with the wire and measuring the voltage across the resistor. Note that this voltage would not now be referenced to earth, but be floating.

As we often want to make our reference point the same for all channels, mode 01 allows us to have three input channels with A_{in3} being the common reference point.

Similarly mode 10 compromises giving two single ended inputs and one differential input. Having sorted

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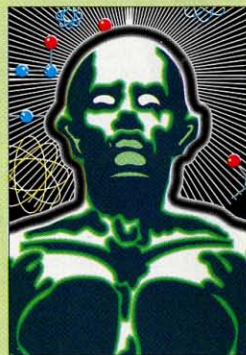
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out the modes how do we switch between them? Figure 11 shows the layout of the PCF8591 control byte. This is the first byte sent to the device, all subsequent bytes will be considered as data bytes.

As you can see, bits 4 and 5 control the input mode and should contain the mode number you want to use. Bits 0 and 1 control which channel you want to read.

Note that in some modes it will be possible to set them to non-existing channels.

When this occurs the PCF8591 automatically uses the highest available channel.

Bit 2 is the auto increment flag. When it is set the channel selected will be moved on to the next available one. This is the mode 1 used in the software last month to test the board.

Finally, bit 6, when set, is used to enable the analogue output and bits 7 and 3 must be at zero.

If you are writing to the board all bytes after this control byte will be sent to the analogue output. If you are reading from the device, the first byte read will be the value of the last channel to be converted.

While this is being sent, the next channel is converted and sent out as the second byte. That's why in last month's software, with the increment flag set, the channels were read in the order Ch3, Ch0, Ch1, Ch2.

● Having sorted all that out, next month we can look at our transistor curve tracer application.

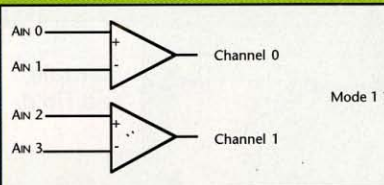
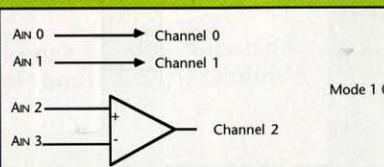
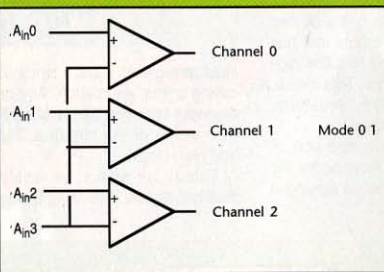
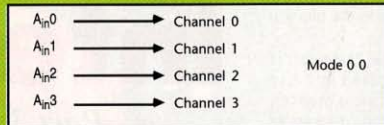
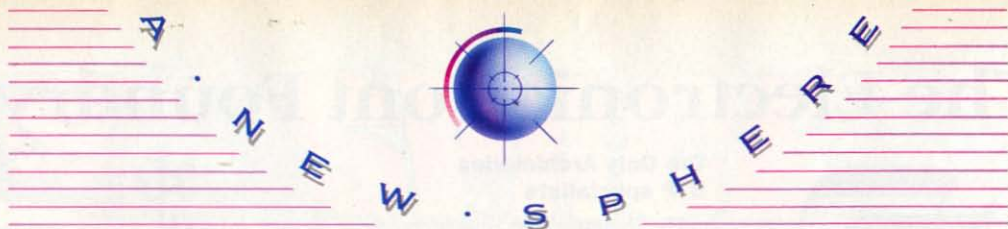


Figure 11: The analogue input modes



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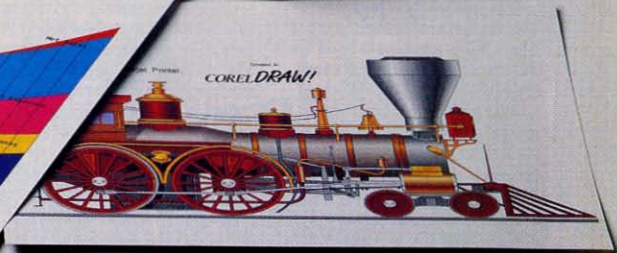
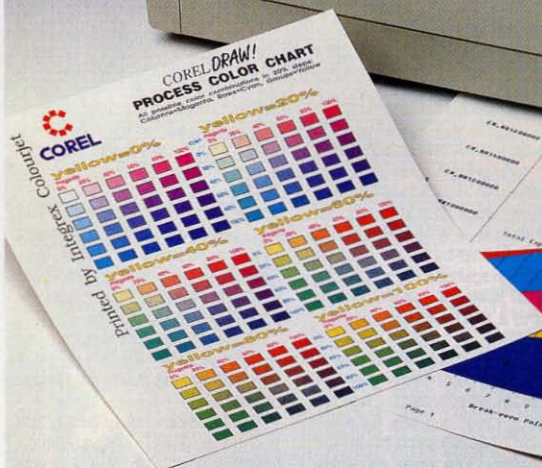
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MiG-29 Fulcrum

...by the seat of your pants

THE documentation accompanying MiG-29 Fulcrum will delight any aircraft enthusiast. In addition to an instruction manual and poster there's a beautifully produced book of the history of the Soviet super-fighter.

Packed with colour photographs, it chronicles the exposure of the MiG-29 from its first public appearance at Farnborough in 1988.

Mikoyan Design Bureau's aircraft is thought to be possibly the best all-round fighter in the world. It's at least as manoeuvrable as the F16, can take off from shorter airstrips, has a faster rate of climb and superior missile firing capability.

Originally released on the PC where it faced stiff opposition from the established airplane simulators of F16, Falcon and Bomber, it's nice to see a named flight simula-

tor on the Archimedes. The last one I remember with the same feel of realism was Red Arrows on the BBC Micro.

British test pilot John Farley announces in the introduction to the manual that the simulation is a good one. As John has had a go in the real thing, I'll take his word for it.

Control is by keyboard or mouse and there is a joystick option. You start your career on a training mission, a simple outing to introduce you to the fighter's layout and capabilities.

You can test your bombing skills on a firing range and try out air-to-surface missiles on ground targets. Drones appear so you can have a go at air combat too.

Should you crash at this stage the loss isn't permanent since Heaven has a brand new Fulcrum fuelled up and ready for take-off. But when you go on a real mission you have just one life.

Five scenarios are on offer, each

beginning with a nice graphic to set the scene. Your first mission is to photograph an American submarine – and not engage the Sea Harriers.

Next you must teach some Chinese upstarts a lesson, then show muscle to a Middle East oil state, followed by an air support manoeuvre against a terrorist group. The final operation requires you to take out a Middle Eastern nuclear reactor.

You can carry out the missions in any order – although they do increase in difficulty level – with the exception of the last one, for which you must have 500 points before you can begin. The later missions demand additional strategy and determination on your part.

Your view from inside the cockpit can be switched to any of eight directions, or you can choose to watch the aircraft from outside. There are also options to see the action from a guided missile's point of view or using the eyes of the tar-

get itself. If you feel more at home on the ground you can sit in the control tower and fly the beast by radio, though the maximum range is only 10km.

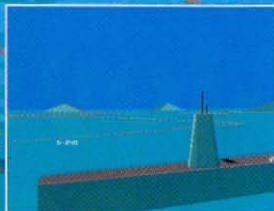
Everything is depicted in solid 3D and the cockpit instruments have a similar appearance to those in other flight simulators – in fact anyone with Interdictor will feel at home, as the controls are almost identical.

The instruments are numerous and vital and experienced pilots will notice subtle differences due to the Russian origin.

The head-up display (HUD) tells you the airspeed, heading, altitude, direction, pitch and velocity of your MiG.

The pitch bars are particularly useful as they stay parallel to the ground and help you keep your wings level when you can't see the horizon.

In the event of HUD failure there is a duplicate set of instrumentation on the head-down display. It's easy to get lost if you don't watch the display,



but there is sufficient information once you understand the guidance system. After that, finding your target is relatively easy.

Your destination is pre-set and you simply have to follow the pointers produced by your instruments. The auto-stabiliser is an especially useful feature. It keeps you straight while flying, but remember to disengage it when you enter combat or it will clamp your manoeuvrability.

If you've had some experience with flight simulators, you'll soon be into the swing of things. The less experienced should take their time, read the manual and experiment.

There are quite a few control keys to learn, though you can get airborne using only a few of them. Becoming familiar with the intricacies of afterburners, airbrakes, flaps, landing gear and wheel brakes does take some time though. The ejector seat is a good place to start. Your real problems start when you meet an enemy

equipped with air power and anti-aircraft artillery. Of course you are not quite defenseless as you are standardly equipped with 23mm cannon, AA-8 heat-seeking air-to-air missiles, AS-7 air-to-ground guided missiles and S-240 air-to-surface rockets.

Effective deployment of these takes skill, especially when you are involved in a dogfight or flying low over a target.

Your current weapon choice is shown on your HUD. Before you fire a guided missile it must be locked on to a target - you'll find the first kill incredibly gratifying.

Landing at home base for refuelling and debriefing - to find out the current mission status - is no picnic. I regularly found myself ablaze on the runway inside a mangled MiG.

This simulator is well programmed, beautifully packaged and the stunning graphics and quick reaction to commands make it a must for any enthusiast.

Jo Giles

CHESS has been played on computers as long as space invaders. Bells and whistles have been added and a lot of time and money spent in developing a game able to beat a really top player, possibly because a large cash prize has been offered for the designers of a game to beat a chess grandmaster.

The latest version to hit the small screen is three dimensional which seems to be one of the prerequisites of such programs these days. The graphics are large, well drawn and represent the traditional chess set. You are presented with additional displays concerning time, moves and overhead display.

You can play against another human or against the computer or - if you get fed up with losing - set the computer against itself. As you can never find another chess player when you need one I chose Archie.

You set the time allowed for the computer's move and the level you want to play. You can - due to the multi-tasking nature of the Archimedes - play more than one game at once, but as the clock is tied to the processor the more games you play simultaneously the slower the clocks will run. You'll need 2Mb to have three games running at once.

Only valid moves are allowed and the list of moves - using standard notation - is displayed on screen. You can scroll through them to assess the play so far if you want.

You move by clicking with the select key on the square you want to move from and then on the square you want to move to. If it is valid your piece will change position, your opponent's clock will start and you await your turn.

You can move by clicking on the overhead display on on the 3D display and the computer's response is outlined on the overhead display so you can tell what is happening.

A pause facility has been built in. The level number acts as a traffic light. Clicking on it changes it from red to yellow to green.

The red and green are obvious, but clicking with the adjust button makes this yellow and allows you to clear the board and set up a board how you want it.

This edit option is handy if you want to reenact a particular move. I would suggest that you only use it if you know your chess as the limited position checking possible in such a program means that you can start with an illegal setup.

As you play you'll notice a book icon above the board, which is the



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Supplier: MicroPower, Northwood House, North Street
Leeds LS7 2AA.
Tel: 0532 458800
Requirements: BBC A3000 and Archimedes range

Chess 3D



computer's book of standard openings and moves. The computer will follow a book line as long as you match its move as it expects. If you don't the book icon will close.

MicroPower have left room for you to add to this as and when you want using the drive icon which is also in the window. The original or your customised book can then be printed out.

There are some very nice features in this version of chess especially the ability to restart from a specific point in the move list, rotate the board, or change sides - though your clock time does move with you.

3D Chess plays a tough game and at the lowest levels it's only the time limit which changes, not the skill involved. I would recommend this to any above average chess player, especially as the extensive print facilities allow analysis of moves and strategies in detail. A help option or an option outlining possible valid moves would have been a useful addition for novice players.

Pam Turnbull

WHEN the Archimedes was first designed no provision was made for adding a joystick. The latest company to tackle this little problem is The Serial Port, who have a 9-pin Atari-style interface which caters for two joysticks at once.

Measuring 6.5cm by 5.5cm the interface plugs into the Archimedes' parallel port. On the top are two sockets where you attach your joysticks and a switch which is used to determine whether the interface is active or invisible.

The 9-pin sockets are the most popular on 8-bit computers and are both inexpensive and come with features like rapid fire.

There is a possible problem for A3000 users as when two joysticks are plugged in the clearance between the parallel port and the internal upgrade panel is minimal. As this is where expansion such as Pres Disc Buffer will be found, be careful.

The interface is rather neatly designed so as to plug into your

parallel port but still allows your printer to be available at the flick of a switch.

Should your software use dongles – as is the case with Impression, for instance – you may find that using interface, printer lead and a dongle that these will stick out. The Serial Port do offer a cable which will overcome this problem though.

Double clicking on the Joystick Test application will ensure that movement is recognised by the software and confirms that the interface and your joysticks are in good working order.

The manual is both informative and well laid out. One outstanding feature is its ability to emulate key presses that various software uses. By equating joystick movement to the relevant keyboard presses it enables you to use a joystick with software not neces-

sarily written with one in mind.

Some applications provided enable you to create your own programs using the interface's own programming language. By creating files using IEdit you can make your software automatically invoke the interface and emulate the correct keys, then go on to load the game. A nice additional application checks that the joystick responds correctly to the simulated key presses.

The Serial Port have produced a package of high calibre which works well with simple or complex games – and there is even a mouse simulation via the joystick.

Brett Colley



Price: £23.95

Supplier: The Serial Port, 30-33 South Street, Chichester, West Sussex PO19 1EL.

Tel: 0243 531194

Requirements: BBC A3000 and Archimedes range

Joystick interface ... adding control



Price: £12.95 (tape), £14.95 (disc), £19.95 (Master Compact disc)

Supplier: Superior Software, PO Box 6, Brigg, South Humberside DN20 9NH.

Tel: 0652 58585

Requirements: BBC Micro or Electron

LAATEST in the line of Sams, number 15, comes on three floppy discs and as usual contains four games – this time two new ones and two old favourites – Cyborg Warriors, Last Ninja 2, Ricochet and Network.

Last Ninja 2 has been a success on many formats and the BBC one was no exception. You are a ninja dressed in the traditional garb and compelled by honour to destroy evil. Perhaps not the most authentic of scenarios or the most original, but it's fun.

Martial arts are as popular as soccer and as you creep, jump and practice ninjutsu all over 1990 New York you'll become hooked.

Over six levels you destroy or avoid thugs, police and bees in Central Park and go on to fight



increasingly tough adversaries on the streets, in the sewers, not to mention offices, cellars and finally the home of the notorious bad guy, Kunitoki Castle.

Bashing everything in sight is good for you from time to time and Last Ninja 2 increases its hold as it has elements of arcade adventure thrown in, with objects to collect and puzzles to solve.

Moving on, Ricochet is an arcade adventure with excellent and cute graphics and some intricate puzzles to solve over five levels. You control S.P.R.A.T – the Small Partially Robotic Alien Time-traveller. The fact that he looks like a very bouncy red rubber ball is irrelevant.

His – and your – quest is to collect one hour glass from each level by rolling left and right, up and down ladders and ropes as well as jumping.

It's very simple in design, but the graphics, humour and puzzles make it a definite must.

The first of the two new games on this compilation is Network. Very reminiscent of Chuckie Egg, you start in the middle of the screen your mission to jump from platform to moving platform avoiding dangerous needles and the like. I liked the *defunct* message when I snuffed it.

Your aim is construct a Flynche machine. This consists of 20 light blue bits and pieces which are scattered throughout the area, but do watch out for the aliens who aim to stop you. You can teleport, manoeuvre or shoot them to prolong your five lives.

The scenario and gameplay are similar to a number of other older products but if you want to try your hand at another arcade adventure



Play it Again Sam

...value for money entertainment

BLASTON!

...save the world again

HOT from France comes a game with no illusions. Blaston is a simple blow up everything in sight game where you collect more fire power and dodge more and more bad guys as you go.

There is a plot of course – you must save the world, again. This time it is CORE323X, a mining planet whose very surface exudes uranium, the now vital fuel for all of known space.

Control the planet and you control the galaxy. Needless to say someone wants to take this away from you – the Korguls. Not only have they rammed your supply vessel but they now threaten to land and massacre the miners.

Being a democratic lot, the miners had a vote and elected you,

Johnny Blast, to save the day. Then they dressed you in the best armour they could find, topped it off with a powerful laser cannon and wished you goodbye.

While they hold the fort you have got to board one of the Korguls' orbiting shuttles, then recapture the supply ship and save the planet and your colleagues.

There are just two more things you need to know. Firstly you have got to top up your oxygen supply every 15 minutes – leaving you three minutes per level. And secondly the Korguls are renowned for their unrivalled animal-like strength.

The game is simple. You scroll up the screen manoeuvring with either the keyboard or joystick and kill everything that shoots.

You will start quite slowly – your speed indicator giving you a speed of one. Also your laser cannon leaves a bit to be desired.

Watch out for the silver balls which litter the place. Shoot them once and when they change shape and colour travel over them to claim your bonus. But shoot them a second time and they'll disappear.

The bad guys can shoot them too, so be quick. Select your bonuses using the spacebar to up your speed



to three and fire back a little more effectively.

I found the most effective way to shoot was at an angle – north-west, south-east and the like. Also shoot where the Korguls are going to be, not where they are.

You are most definitely on your own and the Korguls come in all shapes and sizes. The square robot types are particularly nasty and will do for you in short order.

Collect as many bonuses as possible, for as you progress your adversaries become harder to kill.

When you die you make a lovely mess on screen.

Simple, unpretentious and quite surprisingly addictive, Blaston is well programmed, with good graphics and sound making a professional-looking package. Go on, treat yourself.

Jo Giles



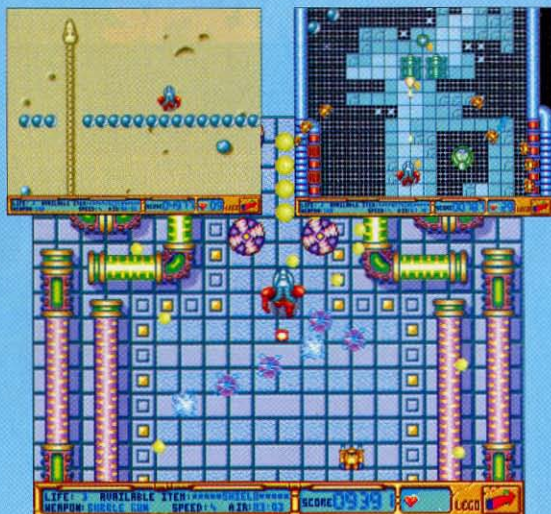
you could do a lot worse worse.

Last, but not least comes **Cyborg Warriors**. It's arcade adventure Commander Stryker-style. You'll find it easy to die and difficult to progress quickly, but again there is nothing different or unusual here.

Basically shoot aliens, collect the tokens they turn into and when you have enough you can boost your weapon power. One niggle is the lack of standardisation of left and right controls here. Cyborg Warriors requires Shift and Z rather than Z and X.

As is usual from Superior, the standard and presentation are of the highest quality. If you haven't already acquired Ricochet and Last Ninja 2 in their previous incarnations than buy Sam 15 – the new ones are a bonus.

Teri Paul



Price: £19.95
Supplier: Eterna/Vector Services,
13 Dennington Road,
Wellingborough,
Northamptonshire NN8 2RL.
Tel: 0933 279300
Requirements: BBC A3000 and
Archimedes range

15



WHAT ho, chaps! Looks like another load of tricky blighters trying to blot out the true blue British spirit. Jolly poor show, what? Have to show 'em we're made of sterner stuff.

New scenarios a bit tougher than before, another 20 missions to fly, plus six recon flights. I was chatting to Flight and he waffled on about completing the six recon missions getting one a medal, or some such rot.

So popped up for a little look-see, just to knock out a couple of Zeppelins – hadn't come across them before. Big? Absolute whoppers, old chap.

And the air was absolutely stiff with those German blighters, Fokker tripehounds mostly – dashed manoeuvrable.

Flak too, by jove. Could hardly move for the stuff, had to stay well over 2,000 feet just to avoid it, any dogfighting and you're soon in the proverbial soup.

Still not too bad, just don't try to take 'em all on, that's what I say: Three to one's OK but twenty to one? Not likely.

Desmond popped by, so we thought why not take a couple of

birds up together, see how it goes. Well, it was a lot of jolly fun, absolutely ripping stuff. Full speed ahead with both of us flying different machines. Terrific.

Took another couple of missions on between us, then got posted to the North Sea. Thought it'd be a bit quieter, but the first thing we had to do was a bit of demolition on a couple of trains and a depot. Still not too hard with two, there's always the other chap to watch your back. Teamwork's the name of the game.

Had one of these new-fangled moving picture cameras, took in the whole trip then back at base we played right through it again.

Jolly fun, we could see everything that happened, and from any angle – even from the the bosch planes as our tracer went through their wings. Super.

Pretty tricky the way things are developing, those enemy builders are certainly putting up some strange birds. Loads more fighters of course, but there's also those Zeps, cargo planes, barrage balloons, oil tankers, gun boats.

There's absolutely everything crammed in, but it's a lot fun – especially with two, each with his own crate.

Well, must sign off now, Desmond



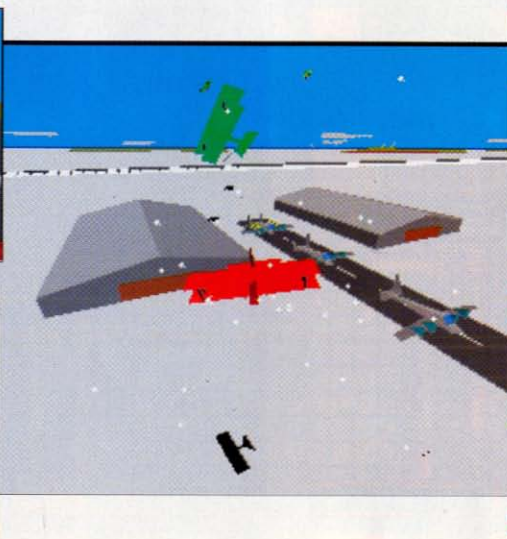
and Greengage have popped over for another spot of Bosch bashing. Tally ho!

Lazarus

Price: Chocks Away Extra Missions £19.95, Chocks Away Compendium £39.95
Supplier: The Fourth Dimension, 1 Percy Street, Sheffield, S3 8AU
Tel: 0742 700661
Requirements: BBC A3000 and Archimedes range

CHOCKSAWAY

... extra missions





BLASTON



You have been chosen from among the best warriors of the Universal Guild to defeat the Korguls invaders, who are trying to take control of your Uranium rich planet for their own purposes. You must fight them in the desert, a factory, a space "grill" and finally their own space ship. Your task isn't simple but you're really the best!

CODER :

FYB

GFX :

Sylvio

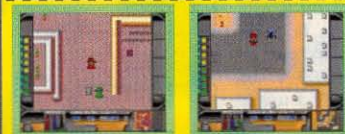
PORRETA

SOUND :

FRD



FINE RACER



Take control over a fast rally buggy and race against various opponents, in a land of adventures.

Your car is upgradable and will respond differently on tarmac, sands or rocks.

Of course, you're not MAD MAX but if you meet him make him bite the dust.

CODER :

FRD

GFX :

SAURE

SOUND :

FRD



BUBBLE FAIR



It all began at the fair.

Inky and Jinky were just having fun when the first bubble came down from the sky ...

This game features 72 levels, challenges, bonus and a special noughts and crosses game.

It uses a big overscan screen (384 x 264) with 256 colors.

AVAILABLE JUNE 91

CODER : Philippe Aubessard
Laurent ROUSSEL

GFX : Stéphane ANQUETIL

MUSIC & SOUND : J. AMBROSSE

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If other micros had the power of the Archimedes, they would have this game ...

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"It's a game of top quality ... Buy this game, you won't be disappointed" 11/90, BBC Acorn User.

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Graphics : 10 - Sound : 10 - Playability : 9 - Value for money : 10 - Overall : 9 - The micro user 3/91.

CODER : FYB

GFX : FRK

SDX : FRD



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CODER : FRD
GFX : FRK - SDX : FRD

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Poster

An object-based DTP package which allows you to do far more than create posters. In fact there isn't much in the way of DTP design and layout that can't be done with Poster. It's almost an art package. The application is fully RISC OS compliant, so can 'talk' to Edit, Draw and any other RISC OS program. Poster comes with its own set of unusual outline fonts but will allow you to use any RISC OS outline fonts. It also has a huge collection of interesting borders and clip art. Two features place

Poster in a different league from other packages. Firstly, you can do wonderful things with text. It can be made to flow along any path or it can be moulded into virtually any shape (as can outline Draw files). Secondly, the size of your document is not dependent upon the limitations of your printer. Poster will allow a document of any size to be created (although 100 metres square is not very practical). It then prints the document in sections which can be cut and assembled using the trim marks. Poster documents may be used in other DTP packages.

Snippet

A utility which will make you wonder how you ever managed without it. Snippet will allow you to print or save any part of any screen. It will even cope with most programs running under the 65Host BBC Emulator. But Snippet will allow you to do lots more. Sprites may be converted from one mode to another and even 8 bit BBC screens may be easily converted into Archimedes sprites. A vast array of tools allows you to trim sprites, add borders, change colours, use outline fonts to add text, edit pixels, rotate sections and combine any number of sprites to make a single sprite. A carousel allows sprites to be displayed.



ALSO...

JIGSAW — allows sprites of any size to be converted into jigsaws with real jigsaw-shaped pieces. It comes complete with a set of pictures including some by the well-known artist Rodney Matthews.

JIGLET — the version for younger users. It has fewer pieces and a more appropriate set of pictures.

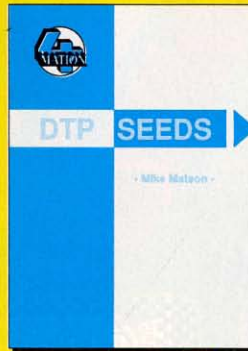
CRAFTSHOP 1 and CRAFTSHOP 2 — programs allowing those with limited artistic ability to create some stunning results. Both packages are currently in use in thousands of schools and homes.



	£	NZ\$
POSTER	89	367.50
SNIPPET	29	120.00
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CRAFTSHOP 1	29	120.00
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CHAOS

reigns

Jim Vernon presents some programs that reveal the unpredictability of nature

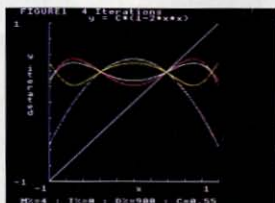


Figure I

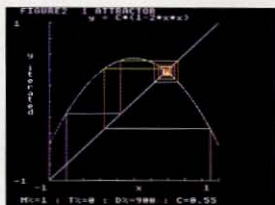


Figure II

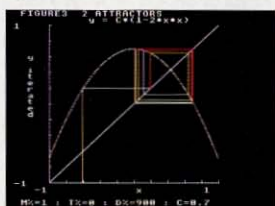


Figure III



Figure IV

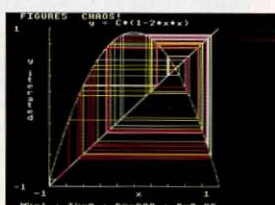


Figure V

RECENT developments in mathematics and science have led to a whole new subject: Chaos. With the help of calculators, then computers, recursive calculations have opened doors to hitherto unguessed developments, from the complex roots of equations and the attractive pictures of the Mandelbrot set to Conway's Life.

Scientists used to believe that if only the right equations and parameters could be found all future physical developments could be calculated from present measurements.

But now they realise there are elements of uncertainty at the very core of scientific truth and that quite tiny changes in parameters or starting conditions can eventually give enormous shifts in results or even lead to total uncertainty: Chaos.

The recalculation of an equation using the result of the previous calculation as the new starting point, known as recursion or iteration, has long intrigued mathematicians. On a computer this becomes a simple matter of jumping back to the beginning of the formula taking the last result with it and so on, round and round.

This short listing illustrates this by iteratively calculating the terms of a geometric progression and summing them, using two as the divisor and one as the base figure. Line 50 is inserted to slow the process down so you can see what is happening:

```
10 x=1:y=0
20 REPEAT
30 x=x/2:y=y+x
40 PRINT x,y
50 A=GET
60 UNTIL FALSE
```

Here x is halved at every repeat of line

20 and rapidly declines to a very small quantity, while y quickly sums to one. Here's a more complex one:

```
10 x=0.9:c=2
20 REPEAT
30 x=c*x*(1-x)
40 PRINT x
50 A=GET
60 UNTIL FALSE
```

The formula in this program — $C \cdot x \cdot (1-x)$ — is known as the simple logistic equation, and is used in biology to show the growth and decline of populations, in which x measures the population (as a fraction of a fixed value) and C is fixed depending on the environment. The formula measures the population at a series of time periods.

With an initial x of 0.9 and C as 2, x fluctuates but rapidly settles to 0.5 and stays there. By changing the value of C in line 10, you will find that for C less than one x rapidly declines to a tiny value.

But for C between 1 and 3, x fluctuates but eventually reaches a single value, that value being given by the formula $x=1-1/C$ and so is independent of the initial value of x. As C gets nearer 3 x takes longer and longer to reach its stable value. For a long time that was as far as the analysis of this formula was taken.

However in the 1970s, Robert May and others discovered that with the value of C above three x, after initial fluctuations, settled down to two values, vibrating between them. At C = 3.3, for example, the values are 0.4792 and 0.8236.

It has been discovered experimentally that some insects, under constant general conditions, have two

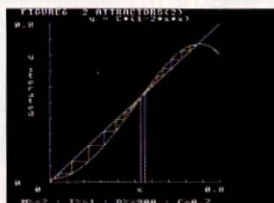


Figure VI

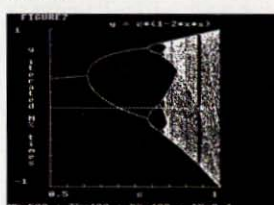


Figure VII

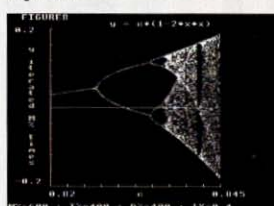


Figure VIII

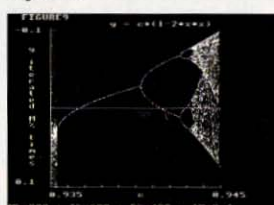


Figure IX

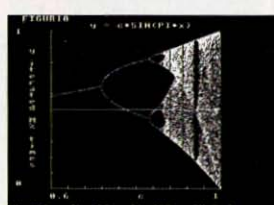


Figure X



significantly different stable population states.

But this wasn't the end of the story. If C is slowly increased beyond 3.4 x stabilises at one of four values, then one of eight and then one of sixteen. The C values have to be increased very slowly and with this simple program that becomes difficult. After a certain value of C (3.575) there is no sign of stability. Chaos has appeared and the values seem to jump all over the place.

To produce this sort of performance the formula in line 30 of Listing II can be any which rises to a single maximum. The following table gives a number of such functions, defined as they would be in a Basic program, with the appropriate ranges of values.

To be able to define any function to be tested and to vary the initial values of x and C a more complex program is required. This is provided by Listing I - Chaos1 - where the formula should be defined in terms of x and C , as in column one of the table.

The value of C and the initial value of x can be specified. There is also scope for the total number of iterations, $M\%$, and the number of these not to be shown, $T\%$, to be varied. It's also possible to choose $T\%=0$ and see the movement towards stability, or choose $M\%=230$ and $T\%=200$ and see whether x has reached stability after 230 iterations. The number of iterations and the value reached are displayed.

You can also increase C progressively by a fixed amount DC by pressing I - to see the effects of gradual increases. If your monitor does not produce clear figures in Mode 0, try Mode 3 by altering line 210 and amend $M\%$ to 20 in line 310.

This program can be used to test out the various functions in the table over the ranges indicated. It will be found that in all cases as C is increased there is first one point of stability, then a bifurcation - split - to vibrate between two values, then four, eight and so on.

Books

R.M. May, Simple Mathematical Models with very Complicated Dynamics (Nature, Vol. 261, 10 June 1976)

E. Rietman, Exploring the Geometry of Nature (Windcrest Books, 1989) - the computer programs in this book are in GW Basic.

J. Gleick, Chaos - Making a New Science (Sphere Books, 1988).

Points of stability

The movement of x to a single point of stability - called an attractor point - or, to two or more points can be graphically studied by Listing II: Chaos2. This graphs the results of any function against the original value of x .

The number of iterates to be shown - $M\%$ - and the beginning number to be excluded - $T\%$ - can be set as before. For example, $M\%=4$ and $T\%=3$ would draw a graph of the 4th iterate only.

After the function is defined and the value of the parameter C fixed, ranges of value for x and y and the number of points to be calculated on the x axis are specified. Axes are drawn with 10 intervals marked to permit accurate measurement of points of intersection. The program also draws the straight line $y = x$. The resulting graph is automatically saved with the values of the parameters used.

Provision is also made in the program for defining two initial values - $FF1$, $FF2$ - for stairways of approach to the limiting values. Figure II shows such a stairway on the first iterate with $C=0.55$.

From $FF1=0.8$ on the x axis a vertical line is drawn to meet the graph $y=F(x)$, which we'll call $G1$, then a horizontal line is drawn to meet the line $y=x$ at point $G2$.

Here x has the same value as $y=F(x)$ at point $G1$ and a vertical line

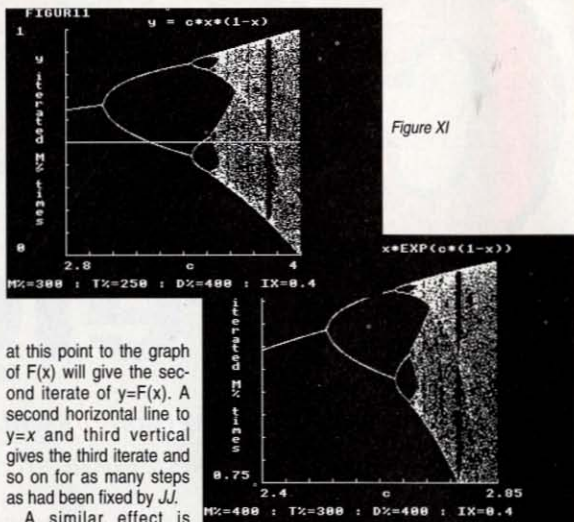


Figure XI

at this point to the graph of $F(x)$ will give the second iterate of $y=F(x)$. A second horizontal line to $y=x$ and third vertical gives the third iterate and so on for as many steps as had been fixed by JJ .

A similar effect is obtained for any value of C less than 0.61 but with higher values the stairway does not reach a single final resting place.

Figure III shows what happens for $C=0.7$ - we get a square. If C is further increased to 0.8 there are two squares as shown in Figure IV.

Figure V shows what happens if C is made more than 0.85: The graph becomes chaotic, repeatedly visiting a whole range of values with a wider range the closer C approaches one.

What is happening when iterated $F(x)$ does not reach a stable value can be examined in Figure VI which is a magnified picture of the part the second iterate between $x=0$ and $x=0.8$ when C is 0.7.

The two stairways start from 0.43 and 0.45 and in this case move by two iterates of $F(x)$ at a time. They settle at two widely separated values of the function. This is, therefore, an example of small differences in initial values producing very different results. Chaos1 can be used to check the values of the stable points in Figures II to VI.

Diagrams of Chaos

As it is clear that variations in the value of c produces differences in the final values of $F(x)$, the next program - Chaos3 - maps iterated values of $F(x)$ against changing values of c .

Any appropriate formula for $F(x)$ can be used, defined in terms of x and c . For each of $D\%$ values of c , $F(x)$ is iterated $M\%$ times. In order to avoid preliminary fluctuations in $F(x)$ the first $T\%$ iterations are not graphed.

$M\%$ and $D\%$ can be made low, say 100, for a quick check that the right

areas have been chosen, but $M\%$ needs to be increased to at least 300 with $T\%$ at 200 and $D\%$ to 400 to produce an uncluttered graph, although with those figures the calculations may take up to an hour. The line $y=XMAX$ is also drawn, the purpose of this will be described later.

Figure VII is a typical product of this program for the function $c*(1-2*x*x)$. As will be seen, in the range where c gives a unique value of $F(x)$ that single value is graphed $M\%-T\%$ times. A small increase in the value of c gives a neighbouring value of $F(x)$, thus producing a single line.

When c reaches its first bifurcation point at 0.61... the line splits in two then as c is increased further each line divides again into four then eight lines.

Chaos3 permits smaller ranges of values of $F(x)$ and c to be selected so that enlargements of particular areas can be studied. Figure VIII is an enlargement of Figure VII around the area where $F(x)$ equals 0.

It will be seen that the shape, allowing for the change in scales, is nearly identical. Further enlargements would produce the same result, within the capacity of the computer. This repetition of the same pattern on an ever decreasing scale is an indication of a fractal.

As c is further increased the values of $F(x)$ show no obvious consistency and, in effect, chaos has started. The graph of $F(x)$ then covers first two vertical lines and later one which gradually grows until it stretches from -1 to 1.

It is, however, a strange kind of

Formula	Ranges			
	x	y	C	XMAX
$C*(1-2*x*x)$	-1,1	-1,1	0.5,1	0
$C*x*(1-x)$	0,1	0,1	1,4	0.5
$C*\sin(\pi*x)$	0,1	0,1	0.5,1	0.5
$C*x*(1-x*x)$	0,1	0,1	1.8,2.6	0.57735
$C*(1-(2*x-1)^4)$	0,1	0,1	0.75,1	0.5
$1-C*x*x$	2,-1	1,0	2	n/a
$C*x-x*30$	2.0,5	1.5,1.6	2.6	n/a
$x*EXP(C*(1-x))$	0,3	0,2	2.4,3	n/a

caption

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chaos, because there are within this dark area values of c at which $F(x)$ has again distinct values. These are visible as vertical white lines. Some can be seen on Figure VII and further enlargement of limited areas would produce a lot more.

By research it is possible to find places in this part of the graph where $F(x)$ has any number of values from

three upwards. With $c=0.936$, for example, there are three distinct values of $F(x)$. This can be verified by program Chaos1 which gives the three values as -0.703 , 0.01 and 0.936 . Increasing c to 0.942 leads to a bifurcation to six values, then 12 and so on until chaos returns again.

Figure IX magnifies the area from $c=0.935$ to 0.945 to show what is happening at the centre of these three values of c . The graph starts

from chaos, suddenly acquires a value – the other two are off the picture – then bifurcates, bifurcates again and rapidly goes back to chaos.

The general shape of the graph is again similar to that in Figure VII.

Chaos3 can be applied to any other formula of the types listed in the table. Figures X, XI and XII show three typical results for the formulae $c \cdot \sin(\pi \cdot x)$, $c \cdot x \cdot (1-x)$ and

$x \cdot \exp(c \cdot (1-x))$. Despite the fact that they originate from very different sources the graphs of iterated $F(x)$, allowing for differences of scale, have a strong family resemblance.

● Well, that's about it for Chaos here. Although there's no end of it in the mathematics world, you can see that at least in some cases it does apply to the real world too.



```
10 REM RECURSIVE CALCULATIONS
20 REM by Jim Vernon
30 REM (c) The Micro User
40 MODE7
50 PRINT"" RECURSIVE CALCULATIONS"
60 PRINT"" Any Suitable Formula"
70 PRINT""The formula is iterated sta
rting from ""a selected value of x. A f
ixed value""of C is chosen. Its value c
an be""increased by pressing any key."
80 PRINT""The number of iterations (M
X) and the""number, if any, not to be p
rinted(TX)""is also selected."
90 INPUT ""Formula in x and C ""X$
100 INPUT ""Value of constant C ""C
110 INPUT ""Increment in C value (DC) ""
DC
120 INPUT""Initial value of x ""IX
130 INPUT ""Total number of iterations
""ITX
```

```
140 INPUT "Number to be ignored ""ITX
150 MODE0
160 MX=ITX:TX=ITX
170 X=IX
180 FOR NX = 1 TO MX
190 IF NX < TX GOTO 220
200 X=X-80080A
210 PRINT"N=";NX;" F(X)=";X;" C=";C
220 X=FNformula(x)
```

```
230 NEXT
240 INPUT"N for more iterations, I to
increment C and E to finish",AS
250 IF AS="N" TX=MX:MX=MX+30: GOTO 18
0
260 IF AS="I" C=C+DC:GOTO 160
270 IF AS="E" END
280 GOTO 240
290 DEF FNformula(X)=EVALX$
```

Get it
right ✓

10 = 0.0	160 = 1750.8
20 = 0.0	170 = 2CEB.7
30 = 0.0	180 = C96E.6
40 = 8AFC.0	190 = 7B3B.8
50 = 3454.A	200 = 7612.5
60 = 8360.3	210 = A955.7
70 = 7840.9	220 = CABB.6
80 = 837C.3	230 = 2C83.7
90 = C53D.C	240 = 6A1C.9
100 = 7EAF.C	250 = 8B9E.2
110 = 29F9.2	260 = FBA1.D
120 = 13.C	270 = 2E59.2
130 = 13A.C	280 = 2305.9
140 = C321.6	290 = E0B6.5
150 = FA1B.A	

```
10 REM STAIRWAY PROGRAM
20 REM by Jim Vernon
30 REM (c) MICRO USER
40 MODE1
50 PRINT"" ANY FORMULA"
60 DIMFF(2)
70 PRINT""This prog. graphs any itera
ted F(x)""against x for any number (MX)
of""iterations and over any range of x
"
80 PRINT""The value of parameter C and
d the total""number of iterations per v
alue of x""to be ignored can be varied.
"
90 PRINT""Beginning and number of stai
rs can be""chosen and early stairs not
shown."
100 REM Input constants, ranges etc.
110 INPUT""Formula in x and C (=";Y$
120 INPUT""Value of C (C) ""C
130 INPUT""Limits of x (X0,X1)""X0,X1
140 INPUT""Limits of y = F(x) (Y0,Y1)""
Y0,Y1
150 INPUT""No. of points on x axis(DX)""
DX
160 INPUT ""Total no. of iterations per
val.x(=MX)""MX
170 INPUT""No. of iterations to be igno
red(TX)""TX
180 TX=TX+1
190 INPUT""Initial stairway values (ze
ro if none, equal if only one) (FF(1)&(2
))""FF(1),FF(2)
200 INPUT""No. of moves to attractor (J
J)""JJ
210 INPUT""No. of moves ignored""IT
220 INPUT""Name of File""AS
230 INPUT""Description""BS
240 CLS
250 VDU19,7,0,0,0,0:VDU19,0,7,0,0,0
```

```
260 REM Draw axes (with 10 divisions),
mark ranges etc.
270 PROCaxis(200,150,200,950)
280 FOR I=1 TO 10:PROCaxis(200,150+I*8
0,210,150+I*80):NEXT
290 PROCaxis(200,150,1000,150)
300 FOR I=1 TO 10:PROCaxis(200+I*80,15
0,210+I*80,160):NEXT
310 PRINT TAB(2,0);AS;" ";BS
320 PRINT TAB(12,1);Y=";X$
330 PRINT TAB(1,2);Y1:PRINT TAB(1,2);
Y0
340 PROCiter(3,6)
350 PRINT TAB(4,28);X0:PRINT TAB(19,28
);X1:PRINT TAB(29,28);X1
360 PRINT TAB(2,30)"MX=";MX;" TX=";TX
-1;" DX=";DX;" C=";C
370 REM Calculate iterated values of y
against values of x
380 K=X1-X0:P=K/DX:L=Y1-Y0
390 DD=3
400 FOR N=TX TO MX
410 FOR x=X0 TO X1 STEP P
420 y=x:z=x
430 FOR K1=1 TO N
440 y=FNformula(y)
450 NEXT
460 S=(y-Y0)*800/L+150
470 SS=(x-Y0)*800/L+150
480 R=(x-X0)*800/K+200
490 REM Values not plotted if outside
chosen ranges
500 IF S<150 OR S>950 GOTO 540
510 IF R<200 OR R>1000 GOTO 540
520 GCOL 0,DD:PLOT 69,R,SS
530 GCOL 0,3:PLOT 69,R,SS
540 NEXT
550 DD=(DD+1)MOD4
560 IF DD=0 DD=1
570 NEXT
```

```
580 IF FF(1)=0 OR FF(2)=0 GOTO 820
590 FOR PP=1 TO 2
600 G=FF(PP)
610 FOR AA=1 TO MX
620 G=FNformula(G):H=G
630 NEXT
640 GCOL 0,3
650 MOVE (FF(PP)-X0)*800/K+200,150:DRAW
W (FF(PP)-X0)*800/K+200,(G-Y0)*800/L+150
660 DRAW(G-X0)*800/K+200,(G-Y0)*800/L+
150
670 BB=(C=C1)
680 REPEAT
690 IF BB=0 BB=1
700 G=H
710 GCOL 0,BB
720 FOR AA=1 TO MX
730 H=FNformula(H)
740 NEXT
750 IF CC=TT GOTO 790
760 DRAW(G-X0)*800/K+200,(G-Y0)*800/L+
150
770 DRAW (G-X0)*800/K+200,(H-Y0)*800/L
+150
780 BB=(BB+1) MOD4
790 CC=CC+1
800 UNTIL CC=JJ
810 NEXT
820 PROCsave(AS)
830 END
840 REM Procedure for drawing lines to
make axes etc.
850 DEFPROCaxis(LX,MX,NX,OX)
860 MOVE LX,MX
870 DRAW NX,OX
880 ENDPROC
890 REM Formula defined
900 DEF FNformula(X)=EVAL(X$)
910 DEF PROCiter(AZ,BZ)
920 LOCAL AS
```

```
930 FOR I = 1 TO 10
940 AS = MID$(Y iterated",I,1)
950 PRINT TAB(AZ,BZ+I)AS
960 NEXT:ENDPROC
970 DEFPROCCLi($8700)LOCALX$,YX
980 YX=7:CALL&FFF7:ENDPROC
990 DEF PROCsave(ZS)
```

10 = 0.0	300 = 5C2E.E
20 = 0.0	310 = 9676.9
30 = 0.0	320 = 9374.9
40 = EA3A.A	330 = 8064.F
50 = 52A0.4	340 = 30B5.2
60 = 4B24.D	350 = TE43.E
70 = 348C.1	360 = F5A6.E
80 = CC32.2	370 = 0.6
90 = E5FC.2	380 = FAD.D
100 = 0.2	390 = 10F9.F
110 = A9B0.D	400 = 9312.F
120 = 3844.7	410 = EBF5.E
130 = 2805.6	420 = 614.B
140 = 230C.1	430 = 8682.7
150 = 59CD.2	440 = 8C99.8
160 = FCC.7	450 = 2C83.2
170 = 53CA.8	460 = 817B.7
180 = 5E5E.A	470 = 9CAE.C
190 = 3E5A.E	480 = 6BAA.9
200 = E23A.B	490 = 0.9
210 = 800D.A	500 = 586.B
220 = E75A.E	510 = 1A5E.1
230 = 3F48.8	520 = 7EC7.7
240 = 7A16.1	530 = 7C9A.C
250 = F71A.1	540 = 2C83.1
260 = 0.1	550 = EBF8.D
270 = 05BA.7	560 = E93A.6
280 = 6C9D.6	570 = 2C83.1
290 = 1757.C	580 = 523D.D



GRAPHICS

```

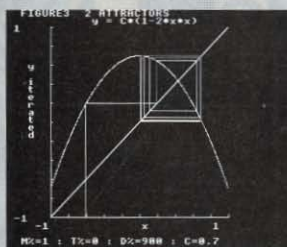
10 REM DIAGRAMS OF CHAOS
20 REM by Jim Vernon
30 REM (c) The Micro User
40 MODE1
50 PRINT "ANY FORMULA Y=F(X)"
60 PRINT "This prog. graphs F(x) iterated MX times against changing c for the chosen formula. Ranges of y and of c and the initial value of x can be varied."
70 PRINT "The range of c is divided into DX intervals and y is iterated MX times for each value of c, the first TX values ignored and the rest, if within the chosen range of Y, graphed."
80 REM Input constants, ranges etc.
90 INPUT "Formula - in x and c ", XS
100 INPUT "Limits of c (=C0,C1)", C0,C1
110 INPUT "Limits of y (=Y0,Y1)", Y0,Y1
120 INPUT "Initial x (=IX)", IX
130 INPUT "No. of points on c axis (DX)", DX
140 INPUT "Total No. of iterations per val.c(MX)", MX
150 INPUT "No. not to be printed(TX)", TX
160 INPUT "Value of XMAX", XMAX
170 INPUT "NAME of File", AS
180 CLS
190 VDU19,7,0,0,0,VDU19,0,7,0,0,0
200 REM Draw axes (with 10 divisions), mark ranges etc.
210 PROCaxis(200,150,200,950)
220 FOR QX=1 TO 10:PROCaxis(200,150+QX

```

```

*80,210,150+QX*80):NEXT
230 PROCaxis(200,150,1000,150)
240 FOR QX=1 TO 10:PROCaxis(200+QX*80,150,200+QX*80,160):NEXT
250 PRINTTAB(2,0);AS
260 PRINTTAB(15,1)"Y = ";XS
270 PRINTTAB(1,2);Y1:PRINTTAB(1,26);Y0
280 PROCiter(3,4)
290 PRINTTAB(6,28);C0:PRINTTAB(19,28)"C":PRINTTAB(30,28);C1
300 PRINTTAB(0,30)"MX=";MX;" TX=";TX;" DX=";DX;" IX=";IX
310 REM Calculate values of F(x) iterated MX times for each c
320 K=C1-C0:P=K/DX:L=Y1-Y0
330 FOR C=C0 TO C1 STEP P
340 Y=IX
350 FOR NX=1 TO MX
360 Y=Fformula(y)
370 REM First TX values of y not shown
380 IF NX<TX GOTO 390
390 YS=(Y-Y0)*800/L+150
400 CS=(C-C0)*800/K+200
410 REM y not plotted if outside range
420 IF YS<150 OR YS>950 GOTO 440
430 PLOT 69,CS,YS
440 NEXT
450 YMAX=(XMAX-Y0)*800/L+150
460 IF YMAX<150 OR YMAX>950 GOTO 490
470 PLOT 69,CS,YMAX
480 REM Same calculations and plot for next value of c
490 NEXT:PROCsave(AS):END
500 :
510 REM Formula defined
520 DEF FNformula(X)=EVAL(XS)
530 :
540 REM Procedure for drawing lines to

```



```

make axes etc.
550 DEFPROCaxis(LX,MX,OX,PX)
560 MOVE LX,MX:DRAW OX,PX
570 ENDPROC
580 :
590 DEFPROCiter(AX,BX)
600 LOCAL AS
610 FOR I=1 TO 19
620 AS = MID$( "y iterated MX times",I,1)
630 PRINTTAB(AX,BX+I)AS
640 NEXT:ENDPROC
650 :
660 DEFPROCcli($$700)LOCALX,Y
670 Y=7:CALL$FFFF:ENDPROC
680 :
690 DEF PROCsave(ZS)
700 IF PAGE<8000 PROCcli("SAVE "+ZS+" 3000 8000")
710 IF PAGE<8000 OSCLI("ScreenSave "+ZS)
720 ENDPROC

```

```

10 = 0 0
20 = 0 0
30 = 0 0
40 = EASA A
50 = AEF 6
60 = 6603 9
70 = DE99 2
80 = 0 2
90 = ABE C
100 = 9ECF 5
110 = 8B71 4
120 = ACFF F
130 = F9F2 4
140 = 185B F
150 = F5C4 3
160 = 5184 7
170 = E754 2
180 = 7A16 8
190 = F71A D
200 = 0 0
210 = 05BA E
220 = 9314 0
230 = 1757 D
240 = D074 6
250 = 33AA 3
260 = ECE6 6
270 = 78D0 0
280 = 56D7 4
290 = AAC3 B
300 = C81E F
310 = 0 F
320 = 23CF 6
330 = 6F01 5
340 = 5A5F E
350 = C96E 6
360 = BC09 1
370 = 0 1
380 = AAC5 4
390 = E73 E
400 = 7040 B
410 = 0 B
420 = 405 E
430 = 2ABF 5
440 = 2C83 0
450 = 50D0 A
460 = 95FD F
470 = 27B 0
480 = 0 0
490 = A96C 9
500 = 9719 7
510 = 0 7
520 = E048 C
530 = 9719 5
540 = 0 5
550 = 1158 1
560 = 0AD9 0
570 = E0DF 5
580 = 9719 A
590 = 7205 6
600 = 309C 0
610 = A40C 1
620 = 8822 9
630 = F1A9 6
640 = E531 7
650 = 9719 9
660 = 6188 3
670 = 50E0 0
680 = 9719 5
690 = 80DE 4
700 = E14F 7
710 = 8000 C
720 = E0DF 3

```

```

1000 IF PAGE<8000 PROCcli("SAVE "+ZS+" 3000 8000")
1010 IF PAGE<8000 OSCLI("ScreenSave "+ZS)
1020 ENDPROC

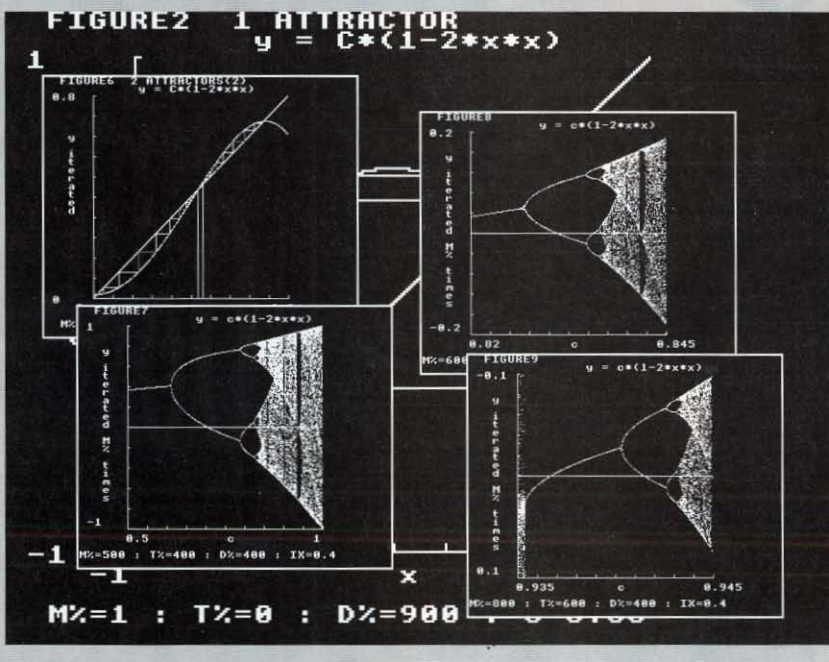
```

Get it right ✓

```

590 = 2F74 F
600 = EEE4 9
610 = F97 B
620 = 9632 A
630 = 2C83 7
640 = 41D9 2
650 = 3190 F
660 = 7A20 C
670 = 9725 5
680 = BFBA 8
690 = A640 F
700 = 2238 6
710 = D208 E
720 = F97 C
730 = F4C2 E
740 = 2C83 8
750 = 52C1 2
760 = 7A20 6
770 = 9E1D 6
780 = 7AED 6
790 = C1D9 8
800 = 2F4D B
810 = 2C83 F
820 = 8483 3
830 = FD2E A
840 = 0 A
850 = 3BA8 B
860 = 9238 4
870 = 31D6 2
880 = E0DF 3
890 = 0 3
900 = E048 6
910 = 3A74 8
920 = 309C B
930 = A8B9 5
940 = 488A A
950 = 23A2 E
960 = E531 B
970 = 6188 3
980 = 50E0 E
990 = 80DE D
1000 = E14F C
1010 = 80D0 1
1020 = E0DF 8

```





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If you are a designer or draughtsman in almost any mechanical field, a technical illustrator or graphic designer, there will come a time when you need to produce an accurate perspective drawing from a dimensioned working drawing.

If you work for a large company using CAD, facilities for making the 3D drawing may be available but if not, and you are not conversant with the subject, a visit to the local public library or the nearest bookshop may seem to be a way round the problem.

If you are able to find any book on the subject it will almost certainly only give details of the traditional geometrical methods, as shown in Figure 1.

There are so many drawbacks to the geometrical methods that they are virtually useless for serious work. A very large sheet of paper is needed for a small view, due to poor accuracy curves cannot be plotted, a very high standard of draughting skill is essential, they are time consuming and lack versatility.

A satisfactory solution is to use a

Take a new PERSPECTIVE

mathematical method, but unfortunately the information is not generally available. The calculations are complex and lengthy, but with the aid of your computer and a suitable program they become child's play.

The obvious advantage is that once data from the working drawing has been entered, it can be used for an infinite variety of views by simply altering a few variables. Also, great accuracy is assured.

The method to be described, which we'll call CAPD - Computer-aided

Harry Wall has a program to produce computer-generated true scale 3D drawings

perspective drawing - is practical, simple to operate, extremely versatile and works like this: The salient points to be used are numbered on the working drawing and the three co-ordinates of each point entered into the computer.

The variables which determine the relationship of object to eye are entered and also the sequence in which the points will be joined together to produce the view. A wire drawing can then be switched on to the screen.

By using the keyboard this can be completely rotated in two planes, enlarged, reduced, and the eye point moved forward and backward.

When the view is to your liking a print out of the X and Y co-ordinates of the final view can be made and saved to disc. These can be used to feed into a plotter, make a drawing manually or dumped to a printer.

The draughting skills needed are minimal. Frame switching using colours is used which means that the next view is drawn on the hidden

screen so that when the views are changed, they do so instantaneously.

The program needs the extra memory that only the B+, Master and Archimedes can provide - unless you have shadow screen on your Model B or Electron.

The basic idea behind CAPD is simple. If you view an object through a flat sheet of glass with one eye closed and the outline seen is marked on the glass, this will be the equivalent of the perspective drawing with the sheet of glass representing the drawing paper.

The maths are solely to translate dimensions W, L and H taken from the subject, to X and Y which are the co-ordinates in the final view. There is no need for you to get involved with the maths since the program takes care of it and therefore you'll be spared a description of how they work.

Although vanishing points are not used, parallel lines on the object converge correctly to invisible vanishing points the positions of which are determined by the variables keyed in.

Before using the program, the first step is to compile a chart listing the width, length and height dimensions taken from the working drawing.

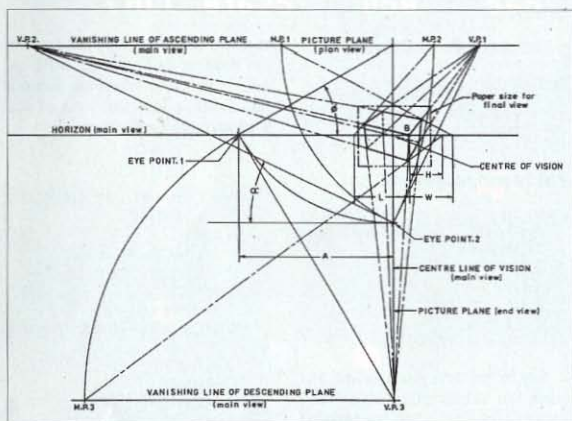


Figure 1: Traditional geometrical methods

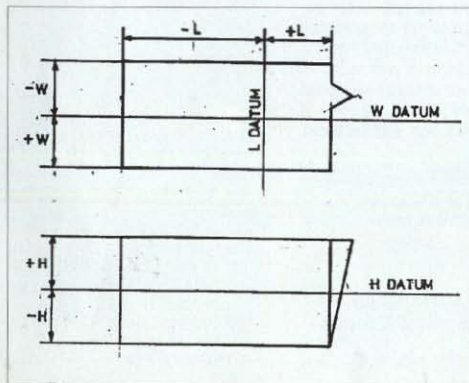
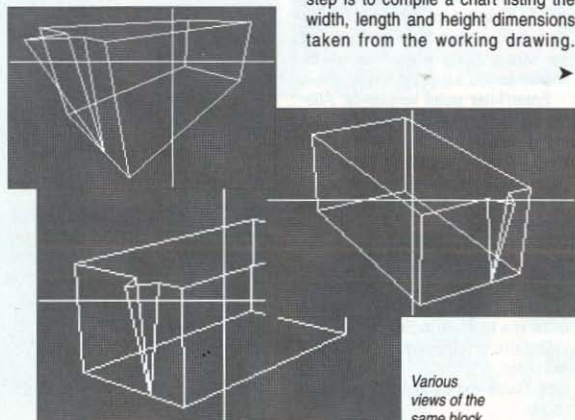


Figure 2



Various views of the same block



GRAPHICS

These are W, L and H. Number each point to be plotted and decide on the W, L and H datums. The way the working drawing is dimensioned will help.

Each dimension must be taken from one of the datums and will be + or - depending on which direction it takes, see Figure II for the rules.

The next step is to relate the W, L and H datums to the centre of vision by determining W2, L2 and H2. For a single subject the C.V. should be at the centre of the object.

It is possible to create a picture having more than one object in it. In this case the C.V. should be at the centre of the scene.

Each subject has to be dealt with separately and the relationship between each object will be determined by the values given W2, L2 and H2.

Provided A, S and SF are the same for each object, when they are finally plotted on a single sheet of paper, they will all fit into the perspective of the scene with all parallel lines converging correctly to common vanishing points. See Figure III for details of the signs for W2, L2 and H2.

When you have reached this stage the worst is over. The program can now be brought in to do the really hard work. Type the listing, check for errors with the checksums and save it as CAPD.

When it's run the main menu will appear, so go from this to Edit. Details of the choices follow, but in the main you simply follow the prompts. At any time, Escape will return you to the main menu.

Enter subject data: Enter all the W, L and H dimensions from your chart following the prompts.

Alter subject data: Enables you to alter any W, L and H dimensions.

Enter/Alter variables: Enter the W2, L2 and H2 values you have established. Default values for A, S, P and SF have been set. You can alter these at any time but for a start it is suggested you leave them until viewing the wire drawing when they will be altered as you adjust the image.

Enter/Alter point sequence: After the points have been plotted you have to tell the computer the order in which they are to be joined. At the end of each sequence when the pen has to be lifted, type 0. At the end of the final sequence type 00.

When altering the numbers press Return until you come to the point wanted then type in the new number. Continue pressing Return to the end of the line to return to Edit menu.

Details of choices on the main menu are:

Edit: Gives you the options as shown above.

Load: Loads any file saved with CAPD.

Save: Saves data from working drawing, variables, co-ordinates for 3D drawing and point sequence.

Preview: Produces a wire drawing on the screen. This can be manipulated by pressing the keys shown in below

The auto key repeat is switched off, but you can press any of the above keys as often as you wish. The A variable, which controls the distance from eye to picture plane, is important.

If too small the view will be distorted and if too large the view will look more isometric than perspective.

Co-ordinates and variables: This displays data from working drawing, variables, co-ordinates for 3D drawing and point sequence. The list is automatically updated each time one of the manipulation keys is pressed in Preview mode.

To plot the 3D view manually, use the 3D co-ordinates X and Y. The 3D view in Figure IV shows the direction the dimensions are taken according to the signs.

The value of SF - scale factor - has been arrived at to suit the size of preview on screen but it may not be what you want for the final drawing.

Look at the X and Y dimensions and decide if you want to alter the overall size. SF can then be altered in Edit mode, in one of three ways. Enter a value, enter SF'n or SF/n, n being the ratio of alteration. You can then go to item five on the main menu to read the revised dimensions.

So that you can try out the versatility of CAPD quickly, below is given the essential data for the block shown in Figure IV:

Point	W	L	H
1	-25	40	35
2	25	40	35
3	25	-60	35
4	-25	-60	35
5	-25	40	-15
6	25	40	-15
7	25	-60	-15
8	-25	-60	-15
9	-15	40	35
10	-5	40	35
11	-10	50	35
12	-10	40	-15

Left cursor	Rotates in a horizontal plane. P decreased 10 degrees.
Right cursor	Rotates in a horizontal plane. P increased 10 degrees.
Up cursor	Rotates in a vertical plane. S decreased 10 degrees.
Down cursor	Rotates in a vertical plane. S increased 10 degrees.
L	Larger in size. SF increased 10 per cent.
S	Smaller in size. SF reduced 10 per cent.
C	Eye point closer to picture plane. A reduced 20 per cent.
F	Eye point farther from picture plane. A increased 20 per cent.
Tab	Return to main menu.

The control keys

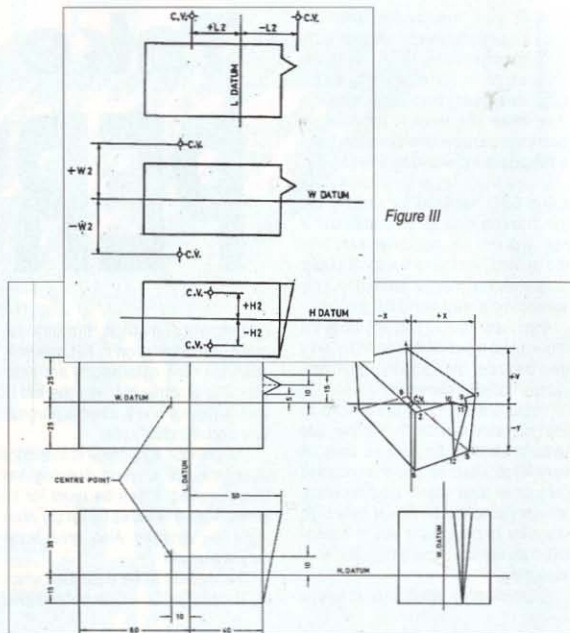


Figure IV

The other main variables are:

A=330 S=30 P=150
W2=0 L2=10 H2=10
SF=5

And the point sequence is:

1,4,3,2,10,11,9,1,5,8,7,6,5,0
10,12,11,0
9,12,0
4,8,0
3,7,0
2,6,0,0

Key in this data - or load it if you have the subscription disc - and experiment with the features provided by CAPD.

Although this example is simple, there is no limit to the complications which can be handled other than the amount of memory in your micro. In particular, curved lines can be plotted very accurately making the method invaluable for subjects such as boats,

cars and aircraft. If you intend making the drawing by freehand, CAPD will enable you to produce an accurate framework to form the basis of your work and give it authenticity.

```

10 REM COMPUTER AIDED PERSPECTIVE
20 REM DRAWING
30 REM BY H.R Wall
40 REM (c) The Micro User
50 REM Load by "CAPD"
60 MODE129
70 ON ERROR GOTO160
80 A=350:S=30:P=30:W2=0:L2=0:H2=0:SF=5

1
90 numpts=0
100 *FX11,0
110 PROCassnol
120 VDU23;8202;0;0;0;
130 DIM A(100,4)
140 DIM B(200,3)
150 DIM C(300)
160 CLS
170 PRINTTAB(5,5);** * MAIN MENU * **
180 PRINT
190 PRINTTAB(5,5);1. Edit:PRINTTAB(5,5);
2. Load:PRINTTAB(5,5);3. Save:PRINTTAB(5,5);4. Preview:PRINTTAB(5,5);5. Co-ordinates and variables:PRINTTAB(5,5);6. Return to Basic:
200 PRINT:B=GET:B=B-48:IF B<1 OR B>6 THEN VDU7:GOTO200
210 IF B=6 THEN 300
220 PRINT
230 ON B GOTO 240,250,260,270,280
240 PROCedit:GOTO160
250 PROCload:GOTO160
260 PROCsave:GOTO160
270 PROCpreview:GOTO160
280 PROCdata:GOTO160

```


Hard Drive Options From The Serial Port

We produce a range of hard drive upgrade options for the Archimedes range of computers. The controller card can be based either on the **SCSI** or **IDE** interface standards and drives come in many capacities for internal (300/400 series) or external connection. The hard drives used are high quality **Seagate** devices which are all fully guaranteed for one year.

SCSI is becoming the Archimedes 'standard' choice due to the range and number of devices you can connect to the interface - such as tape streamers, scanners printers, CD-ROM drives etc as well as hard drives. Our SCSI package uses our **fast 8-bit interface podule** - also available as an **internal A3000 card** at no extra cost - and Acorn SCSI compatible software.

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Example prices (including interface) - for other drive capacities (up to 1352Mb) please contact us:

SCSI	45Mb 28ms Internal	£299	80Mb 24ms Internal	£399
	External	£369	External	£469
IDE	40Mb 28ms Internal	£269	89Mb 19ms Internal	£379
	External	£349	External	£449

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For a full specification sheet please contact us.

"Frankly, I think the addition of such a board should be a very high priority. An upgrade equal to adding an ARM 3 board, and cheaper...The Serial Port promises us that the board will be something very special and I am inclined to agree. I think that the Graphics Enhancer will appeal to a massive Archimedes market." **Computer Shopper April 1991**

"Considering what is provided, the price of the Graphics Enhancer is very reasonable."

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The Serial Port, Burcott Manor, Wells, Somerset BA5 1NH

Tel: 0243 531194 Fax: 0243 531196

All prices above exclude VAT. SCSI and IDE systems can be installed by us for an extra £25 - otherwise delivery is £10.



```

290 GOTO160
300 END
310 DEF PROCPreview
320 CLS
330 PROCcalfcframe
340 ZR%:=1:ZR1=ZR%
350 PROCdrawframe1(ZR1)
360 PROCframe1on
370 PROCmove
380 PROCkeyin
390 IF G=9 THEN 540
400 PROCcalfcframe
410 ZR%:=1:ZR1=ZR%
420 PROCdrawframe2(ZR1)
430 PROCframe2on
440 PROCceraseframe1(numpts%+1)
450 PROCmove
460 PROCkeyin
470 IF G=9 THEN 540
480 PROCcalfcframe
490 ZR%:=1:ZR1=ZR%
500 PROCdrawframe1(ZR1)
510 PROCframe1on
520 PROCceraseframe2(numpts%+1)
530 GOTO370
540 ENDPROC
550 DEF PROCdraw(ZR%)
560 RX:=0:PROCpntum
570 REPEAT
580 X=B(pntum%+ZR%-
1,2):Y=B(pntum%+ZR%
-1,3)
590 PLOT 69,X,Y
600 PROCpntum
610 REPEAT
620 X=B(pntum%+ZR%-
1,2):Y=B(pntum%+ZR%
-1,3)
630 PLOT 5,X,Y
640 PROCpntum
650 UNTIL pntum%=0
660 PROCpntum
670 UNTIL pntum%=0
680 PROCdatums
690 ENDPROC
700 DEF PROCpers
710 R=P/180
720 IF L+L2=0 AND W+W2=0 THEN
B9:=0:V=0
:GOTO770
730 IF L+L2=0 THEN
B9:=90*R:V=W+W2:GOTO
770
740 IF W+W2=0 THEN
B9:=0:V=L2+L2:GOTO77
0
750 B9=ATN((W+W2)/(L+L2))
760 V=(W+W2)/(SIN(B9))
770 K=V*SIN((P*R)+B9)
780 L9=V*COS((P*R)+B9)
790 IF H-H2=0 THEN BA=0:T=L9:GOTO830
800 IF L9=0 THEN BA=90*R:T=H-
H2:GOTO83
0
810 BA=ATN((H-H2)/L9)
820 T=(H-H2)/(SIN(BA))
830 Y1=T*SIN(BA+(S*R))
840 J=T*COS(BA+(S*R))
850 X=K*A/(A+J)
860 Y=Y1*A/(A+J)
870 X=X*SF+640:Y=Y*SF+512
880 ENDPROC
890 DEF PROCassigncol
900 VDU19,0,4,0;:REM Frame 1 Back
910 VDU19,1,7,0;:REM Frame 2 Fore

```

```

1660 RX=RX+1:PRINT#VV,C(RX)
1670 IF C(RX)>0 THEN 1620
1680 CLOSE#VV
1690 ENDPROC
1700 DEF PROCload
1710 PRINTTAB(10)** * LOAD * **,'
1720 PRINT "":INPUT"File name "
fname$
1730 VV=OPENUP(fname$)
1740
INPUT#VV,numpts%,A,SF,H2,L2,W2,S,P
1750 FOR RX=1 TO numpts%:FOR CX=1 TO 4
1760 INPUT#VV,A(RX,CX):NEXT:NEXT
1770 RX=0
1780 REPEAT
1790 RX=RX+1
1800 INPUT#VV,C(RX)
1810 UNTIL C(RX)=0
1820 RX=RX+1:INPUT#VV,C(RX)
1830 IF C(RX)>0 THEN 1780

```

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```

1840 CLOSE#VV
1850 ENDPROC
1860 DEF PROCdata
1870 CLS
1880 PROCcalfcframe
1890 QX=B02020A
1900 PRS="0":VDU14
1910 PRINTTAB(3,5);" * * CO-ORDINATES
an
d VARIABLES * * *
1920 PRINTTAB(5)"SUBJECT DATA"
1930
PRINT;TAB(5)"Pt.";TAB(15)"W";TAB(2
4)"L";TAB(33)"H"
1940 FOR=1 TO numpts%
1950
QX=B90A:PRINT;TAB(5)A(R,1);QX=B02
020A:PRINT;TAB(13)A(R,2);TAB(22)A(R,3);
T
AB(31)A(R,4):PRINT:NEXT:PRINT'
1960 PRINTTAB(3)"VARIABLES"
1970 QX=B90A
1980 PRINTTAB(3)"A=";A;" S=";S;"
P=";
P;" W2=";W2;" L2=";L2;'
1990
PRINTTAB(3)"H2=";H2;QX=B02020A:PR
INT;" SF=";SF
2000 QX=B90A
2010 PRINT'
2020 PRINTTAB(7)"3D CO-ORDINATES"
2030
PRINTTAB(7)"No.";TAB(17)"X";TAB(27
)"Y";'
2040 FOR R=1 TO numpts%
2050
QX=B90A:PRINT;TAB(7)B(R,1);QX=B0
2020A:PRINTTAB(10)B(R,2)-
640;TAB(25)B(R,
3)-512:PRINT:NEXT
2060 QX=B90A
2070 PRINT'
2080 PRINTTAB(6)"Order in which to
join
points"
2090 PRINTTAB(2)"Note! Q=Lift pen
0,0=
end of plotting"
2100 R=0

```

```

2110 REPEAT
2120 R=R+1
2130 PRINT;C(R);";";IF ?81E>36 PRINT'
2140 UNTIL C(R)=0 AND C(R+1)=0
2150 PRINT;"0"
2160 IF PRS="Y" VDU3:GOTO2210
2170 PRINTTAB(3);:INPUT"Printer? Y/N "P
RS
2180 IF PRS="N" GOTO2210
2190 IF PRS<>"Y" THEN 2170
2200 VDU2,15:GOTO 1910
2210 ENDPROC
2220 DEF PROCdatums
2230 PLOT 69,0,512
2240 PLOT 5,1280,512
2250 PLOT 69, 640,0
2260 PLOT 5,640,1024
2270 ENDPROC
2280 DEF PROCedit
2290 CLS
2300 PRINTTAB(10,5)** * EDIT * *
2310 PRINTTAB(5)"1. Enter subject data"
'
2320 PRINTTAB(5)"2. Alter subject data"
'
2330 PRINTTAB(5)"3. Enter/Alter variabl
es"
2340 PRINTTAB(5)"4. Enter/Alter point s
equence"
2350 PRINTTAB(5)"5. Return to Main Menu
"
2360 PRINT:ED=GET:ED=ED-48:IF ED>5 VDU7
:GOTO2360

```

10 =	0 0	440 =	3A84 A
20 =	0 0	450 =	3227 3
30 =	0 0	460 =	700B D
40 =	0 0	470 =	9C11 I
50 =	0 0	480 =	1C06 5
60 =	ACED 0	490 =	3B9F 8
70 =	1310 E	500 =	6B7 3
80 =	1C8C 9	510 =	989F D
90 =	AE9 E	520 =	3F1B 1
100 =	B046 1	530 =	856 5
110 =	340C 6	540 =	ED0F E
120 =	F716 8	550 =	AC04 4
130 =	157E 4	560 =	493B A
140 =	8A7C 4	570 =	BFBA 5
150 =	AA25 0	580 =	6072 2
160 =	7A16 4	590 =	22C0 9
170 =	3AE4 C	600 =	4533 C
180 =	7A75 A	610 =	BFBA 7
190 =	AE21 9	620 =	6072 1
200 =	3E43 A	630 =	3260 8
210 =	B255 6	640 =	4533 1
220 =	1F96 F	650 =	484B A
230 =	D00A A	660 =	4533 5
240 =	FC70 3	670 =	484B 3
250 =	F469 0	680 =	20B1 7
260 =	F7F 2	690 =	ED0F 5
270 =	8965 B	700 =	F798 D
280 =	C1F8 F	710 =	FC7 4
290 =	B0C3 6	720 =	DEF5 B
300 =	F02E F	730 =	2244 8
310 =	50B 1	740 =	3499 5
320 =	7A16 F	750 =	42CB B
330 =	1C06 1	760 =	1E18 F
340 =	3B9F 1	770 =	37AF 4
350 =	67B7 C	780 =	679E 7
360 =	989F 7	790 =	BF3C C
370 =	3227 2	800 =	DEE3 1
380 =	700B 4	810 =	2990 F
390 =	9C11 9	820 =	F32 9
400 =	1C06 8	830 =	340D 0
410 =	3B9F 7	840 =	913C E
420 =	A957 F	850 =	81FC E
430 =	C1CF E	860 =	B6F1 6



```

2370 ON ED GOTO 2380,2390,2400,2410
2380 PROCsubjectin:GOTO2290
2390 PROCsubjectmod:GOTO2290
2400 PROCvarin:GOTO2290
2410 PROCjoinin:GOTO2290
2420 IF ED=5 GOTO2440
2430 GOTO2290
2440 ENDPROC
2450 DEF PROCvarin
2460 CLS
2470 PRINTTAB(5,4)"* * ENTER/ALTER
VARI
ABLES * ****
2480 PRINTTAB(2)"Enter new value or
els
e press RETURN""
2490 PRINTTAB(2)"Eye to C.V. (A=";A;")
";:INPUT XX:IF XX=0 A=A ELSE A=XX
2500 PRINT:PRINTTAB(2)"Tilt of base
(S
=";S;")";:INPUT XX:IF XX=0 S=S ELSE
S=XX
X
2510 PRINT:PRINTTAB(2)"Rotation
P=";P
";:INPUT XX:IF XX=0 P=P ELSE P=XX
2520 PRINT:PRINTTAB(2)"Width datum to
C.V. (W2=";W2;")";:INPUT XX:IF XX=0
W2=
W2 ELSE W2=XX
2530 PRINT:PRINTTAB(2)"Length datum
to

```

```

C.V. (L2=";L2;")";:INPUT XX:IF XX=0
L2
=L2 ELSE L2=XX
2540 PRINT:PRINTTAB(2)"Horiz. datum
to
C.V. (H2=";H2;")";:INPUT XX:IF XX=0
H2
=H2 ELSE H2=XX
2550 PRINT:PRINTTAB(2)"Scale factor
(S
F=";SF;")";:INPUT XX:SF=EVAL(XXS):IF
X
X=0 SF=SF ELSE SF=XX
2560 ENDPROC
2570 DEF PROCsubjectmod
2580 CLS
2590 PRINTTAB(5,8)"* * ALTER SUBJECT
DA
TA * ****
2600 PRINTTAB(5)"Point No. to alter
";:
INPUT:R=0:GOTO2610
2610 PRINTTAB(5)"Width
(W=";A(R,2);")
";:INPUTXX:IF XX=0 A(R,2)=A(R,2) ELSE
A
(R,2)=XX
2620 PRINTTAB(5)"Length
(L=";A(R,3);")
";:INPUTXX:IF XX=0 A(R,3)=A(R,3) ELSE
A
(R,3)=XX

```

```

2630 PRINTTAB(5)"Height
(L=";A(R,4);")
";:INPUTXX:IF XX=0 A(R,4)=A(R,4) ELSE
A
(R,4)=XX
2640 PRINTTAB(5);:INPUT"Another
point
? Y/N "ANS
2650 IF ANS="N" THEN 2680
2660 IF ANS<>"Y" THEN 2640
2670 GOTO 2580
2680 ENDPROC
2690 DEF PROCsubjectin
2700 R=numpts+1
2710 CLS
2720 PRINTTAB(5,8)"* * ENTER SUBJECT
DA
TA * ****
2730 PRINT TAB(5)"Pt. No.
";R:A(R,1
)=R
2740 PRINTTAB(5)"Width (W)
";:INPUTX
X:A(R,2)=XX
2750 PRINTTAB(5)"Length (L)
";:INPUTX
X:A(R,3)=XX
2760 PRINTTAB(5)"Height (H)
";:INPUTX
X:A(R,4)=XX
2770 PRINTTAB(5);:INPUT"Another
point

```

```

? Y/N "ANS
2780 IF ANS="N" THEN 2810
2790 IF ANS<>"Y" THEN 2770
2800 R=R+1:GOTO 2710
2810 numpts=R
2820 ENDPROC
2830 DEF PROCjoinin
2840 CLS
2850 PRINTTAB(5,3)"* * ORDER OF
JOININ
G POINTS * ****
2860 PRINTTAB(2)"Note! 0=lift pen
0,0=
end of plotting""
2870 R=0
2880 REPEAT
2890 R=R+1
2900 PRINT;" Point No.
(";C(R);");:IN
PUT PNS:IF ASC(PNS)=1
C(R)=C(R):GOTO293
0
2910 PROCjoinstr
2920 C(R)=PN
2930 UNTIL C(R)=0 AND C(R-1)=0
2940 ENDPROC
2950 DEF PROCjoinstr
2960 PN=0
2970 FORN=1 TO LEN(PNS)
2980 PN=PN*10+(ASC(MIDS(PNS,N))-48)
2990 NEXT
3000 ENDPROC
>*check

```

```

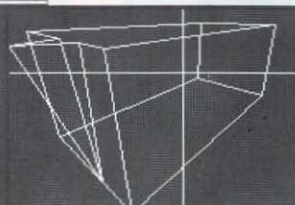
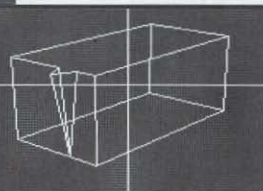
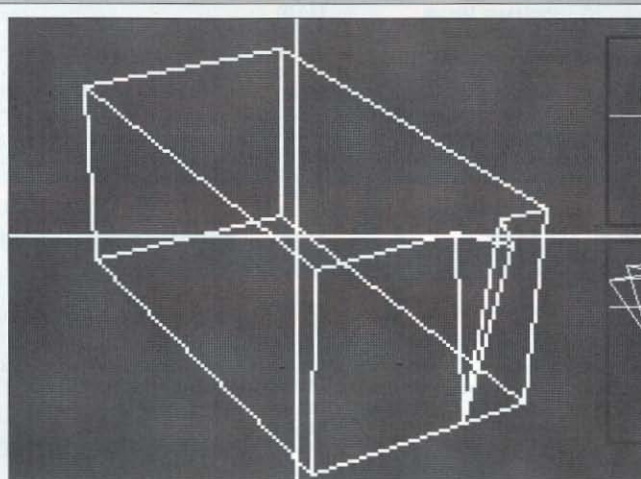
870 = 8734 7
880 = EDOF C
890 = CB1E B
900 = 8CEA 9
910 = 509 7
920 = 34C 1
930 = 8A7F 1
940 = EDOF E
950 = 1250 8
960 = E675 B
970 = 8349 1
980 = EDOF B
990 = 4800 3
1000 = 70A9 F
1010 = 2895 D
1020 = EDOF A
1030 = 41E4 3
1040 = 502C C
1050 = 9CB1 E
1060 = EDOF 1
1070 = DA57 4
1080 = 604F E
1090 = C9E2 7
1100 = EDOF 6
1110 = 4433 F
1120 = 341F 8
1130 = 9CB1 7
1140 = EDOF 9
1150 = 8AD3 E
1160 = 47C 4
1170 = 9CB1 5
1180 = EDOF 1
1190 = AC48 4
1200 = 0C92 2
1210 = 200B 6
1220 = 480F E
1230 = ABF8 F
1240 = 4327 E
1250 = C83 5
1260 = EDOF 7
1270 = 7E7C 1
1280 = E383 2
1290 = EBB 0

```

```

1300 = CFAA 8
1310 = EE43 5
1320 = E097 C
1330 = C17E D
1340 = B574 0
1350 = 43D4 B
1360 = 2C12 4
1370 = FE96 A
1380 = 65B7 6
1390 = 848D 4
1400 = F3A2 4
1410 = EDOF F
1420 = E314 1
1430 = EDB9 2
1440 = 200B D
1450 = A2AF 4
1460 = 69F4 3
1470 = 3F86 0
1480 = 3FD1 A
1490 = 2C83 B
1500 = EDOF 2
1510 = 4B44 9
1520 = 867 8
1530 = EDOF 0
1540 = EB7 5
1550 = F6DE 2
1560 = 9008 1
1570 = 38B6 6
1580 = 5996 1
1590 = E3FF 1
1600 = E3FF 1
1610 = 80FF E
1620 = BFBA C
1630 = D8E2 2
1640 = D17F 9
1650 = 8861 F
1660 = 676D 0
1670 = D3E7 5
1680 = 1AC8 9
1690 = EDOF C
1700 = 503A B
1710 = E258 3
1720 = 9008 3

```



```

1730 = 16F2 A
1740 = 8981 B
1750 = E3FF 8
1760 = D67 A
1770 = B0FF F
1780 = BFBA D
1790 = D8E2 7
1800 = 60E7 D
1810 = 8861 4
1820 = D6F8 6
1830 = 53C7 7
1840 = 1AC8 4
1850 = EDOF E
1860 = 62D8 9
1870 = 7A16 E
1880 = 1C06 B
1890 = C0FC 1
1900 = E70A E
1910 = F3AE B
1920 = 8AB2 9
1930 = 37C7 0
1940 = 310B F
1950 = E38F 7
1960 = C06F A
1970 = 90E2 8
1980 = 9A10 8
1990 = 6992 0
2000 = 90E2 E
2010 = 1F96 8
2020 = 6B15 7
2030 = 1380 1
2040 = C043 B
2050 = B62F 5
2060 = 90E2 D
2070 = 7475 0
2080 = 7A12 0
2090 = 9894 6
2100 = 7534 8
2110 = BFBA 5
2120 = 881E A
2130 = D6BE C
2140 = D16C E
2150 = 385B 8
2160 = 201F D
2170 = 50FB 4
2180 = 16BA 8
2190 = 5877 6
2200 = 4F27 B
2210 = EDOF F
2220 = B87F 9
2230 = 6C86 2
2240 = 99B1 0
2250 = 24F1 9
2260 = 81FB 9
2270 = EDOF 4
2280 = C824 B
2290 = 7A16 B
2300 = EB9F 6
2310 = E344 8
2320 = 368A 8
2330 = 20A2 A
2340 = 87B 2
2350 = 72A0 3
2360 = 967 4
2370 = 44D0 A
2380 = 545A 9
2390 = 9C0B 1
2400 = CB67 B
2410 = 900B 4
2420 = 6813 1
2430 = 1C89 6
2440 = EDOF 5
2450 = 615C 0
2460 = 7A16 E
2470 = D38B 8
2480 = AB89 C
2490 = 120C 1
2500 = 17FC 6
2510 = 1CE 5
2520 = F43C 5
2530 = 64A4 9
2540 = AF72 D
2550 = A065 7
2560 = EDOF 9
2570 = 33F7 8
2580 = 7A16 0
2590 = DFA7 A
2600 = 9CA2 2
2610 = 905B D
2620 = 6006 D
2630 = 18B2 2
2640 = D153 3
2650 = C581 0
2660 = A257 0
2670 = 80C8 E
2680 = EDOF D
2690 = AE4A 8
2700 = 27E6 9
2710 = 7A16 8
2720 = B750 7
2730 = 7B3F 5
2740 = 51CB B
2750 = FF91 2
2760 = A50B 5
2770 = D153 B
2780 = 2525 7
2790 = 42F3 4
2800 = 650C 1
2810 = 460D E
2820 = EDOF 6
2830 = 6A9F 8
2840 = 7A16 1
2850 = 5A8E 6
2860 = 989A 9
2870 = 7534 1
2880 = BFBA E
2890 = 881E 0
2900 = 4E68 7
2910 = 495C 9
2920 = 88B2 2
2930 = 1CE9 7
2940 = EDOF D
2950 = 6423 3
2960 = 360D B
2970 = 1552 D
2980 = 85A9 0
2990 = 2C83 3
3000 = EDOF 6
>*sp.

```

Get it
right ✓

Archimedes Software

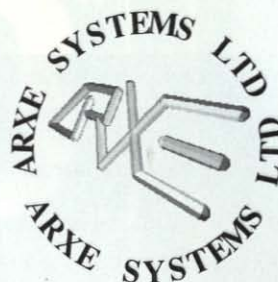
E & OE

Desktop Publishing

Acorn Desktop Publisher	£108.00
Fonts	
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Snippet	£29.00
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PowerBand	£19.00
Professor Mariati	£15.00
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Knowledge Organiser	£46.00
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ArcDFS	£23.00
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Arcterm 7	£61.00
Cambridge Pascal	£61.00
Fortran 77	£84.00
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Jigsaw	£27.00
Junior Database	£51.00
Magpie	£50.00
Numerator	£68.00
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Sound & Music

ARTiculate (Speech Synth)	£19.00
Armadeus	£59.00
Rhapsody	£37.00
Superior Speech	£15.00
Tracker	£38.00

MultiFS

MultiFS provides the Archimedes with multiple filing system support. It allows the user to read and write to PC, Atari ST and BBC DFS discs from within the desktop environment.

MultiFS Features

- * True RISC OS Filer
- * Provides Access to DOS partitions
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- * Filetypes mapped to DOS extensions
- * Formats and creates system discs
- * Supports disc names for DOS

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Pipedream 3	£110
Revelation	£66
Schema	£95
Squirrel	£108
Tracker	£38

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Blaston
Chess 3D
Fine Racer
Mig 29 Fulcrum
Real McCoy 2
Wonderland

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The Graphics Enhancer card from the Serial Port gives you the choice of 16.7 million colours.

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Your technical questions answered by MIKE COOK

Just not talking

I WOULD like to transfer some files from my brother's Amiga to my Archimedes. Can I use the serial port for this? If so, which pins need to be connected?

The Amiga's serial port includes connections with the same names as the Archimedes' nine and I've tried joining the five needed for communicating between two Model Bs but the computers seem to ignore each other. — Matthew Chilton, Oxford.

● The simplest way of transferring between the two machines is to use the PC disc format. You can get an Amiga utility to write to a PC formatted disc and they can be read on the Archimedes by something like MultiFS, PC-Access or the public domain, PCdir.

However if you want to use the serial port remember that the TX data line from one computer has to be connected to the RX data of the other. In

addition the Archimedes needs the DCD, DRS, CTS and DTR line all connecting together. Finally the baud rate and data format need to be the same.

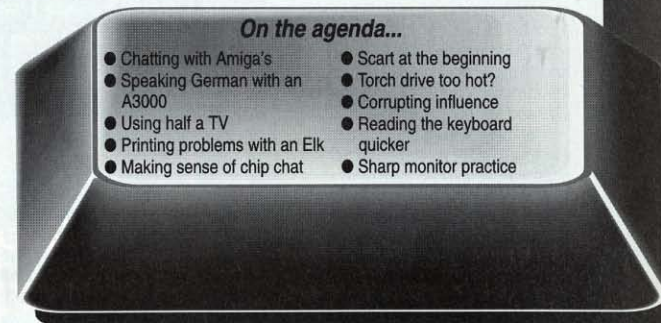
The problem here is that a lot of people do not bother with the data format, but the default values on the BBC Micro and the Archimedes are different. The command 'FX156,18 will set up the word format to 8 bits data no parity and 1 stop bit. See the User Guide for other formats.

A3000 on the air

WHENEVER I use my BBC A3000 I keep getting Radio 1! Well, it's not Radio 1, but I do keep hearing a radio station broadcasting in German on the FM waveband.

It comes from the speaker on the disc drive side. The sound is intermittent and very low volume.

What is making this noise and how do I get rid of it? I have a Beebug A3000 disc drive buffer fitted. Could



the plug between the board and the internal drive have a gap which performs like a variable capacitor? — A. T. Marketos, Liphook, Hants.

● I doubt that you are picking up a German FM radio station, as such transmissions are normally restricted to line of sight — about 50 miles. You are probably picking up the medium wave transmissions of the same radio station.

This is not particularly strange and has nothing to do with anything acting as a variable capacitor. What is happening is that the input to the audio amplifier is acting as a radio detector.

Again, this is not strange as a radio

detector can simply be a diode and the base emitter junction of an input transistor will act in that way.

As the radio signal is so small the volume is not very loud. You can make it louder by attaching a long piece of wire to the audio input. However what you really want to know is how to stop it, and a simple 33pF capacitor between the audio input and earth should do the trick.

Saving eyesight

RECENTLY I bought a secondhand Master and have been using it with my 14in portable TV. I also have a Commodore 64 with a Commodore 1702 colour monitor which I am considering selling.

I understand that colour TVs don't make good VDUs for computers, and I was wondering if it is possible to use my Commodore 1702 monitor rather than doing away with it.

The back of the monitor has three inputs terminals — Audio, Luma and Chroma — which are all used to connect to the computer.

I'd be grateful if you could help me, as it would save me a lot of money and cause less damage to my eyesight. — H. Matin, Hendon, London.

● The 1702 is half a TV set, in that it requires separate Chroma (colour) and Luminosity (brightness) signals. These are the two parts of a colour signal that are mixed together on the Master.

What you need to do is to separate

When an Electron elects not to print

I HAVE an Electron with Plus 1 and Plus 3 and use View. The setup drives a Brother M1009 printer quite successfully. It also works with a Centronics GLP and an Adler Royal 2000 daisywheel which gives excellent print quality.

But I just can't get it to drive the Epson P40 battery-operated printer properly, as I get about 50per cent garbage — yet this printer works perfectly with a BBC Micro and a Dragon 64.

I suspect that the Electron does not use quite the right voltage levels and it may require adjustment using pull-up or pull-down resistors.

Unfortunately I don't understand these things, so I wonder if you

could explain it in some detail? — W. Elliott, Liverpool.

● The load resistance of any input is simply a measure of how much power it will drain from an output. For example if a device had a load resistance of 1k Ω then if an output wants to drive it to 5 volts the output will have to be capable of delivering 5mA. The formula is: Amperes = Volts / Resistance.

Most devices have an output resistance. This coupled with the input resistance forms a potential divider. In the above example suppose the output had an output resistance of 1k Ω then when the output went to 5 volts the input

would only be driven to 2.5 volts, the two resistors splitting the applied voltage.

This is something of an artificial example, as most outputs have a low resistance — normally less than 100 ohms — and most inputs are often very high, like 100k Ω .

As your P40 is a battery-operated device it could be that the input threshold is a bit higher than that provided by the computer. If this is so you would need a pull up resistor of about 3k Ω on each input going to the printer's supply.

Often this voltage is available on the connector. However, the problem could be caused by the lack of a common earth.





these inside the Master. The luma input of the monitor should be taken from the monochrome video output socket of the Master and the Chroma input from the junction of transistor Q12 and the 1k resistor R137.

In addition the Commodore system, being American, uses NTSC as opposed to the PAL system used in this country. The Master can be converted to NTSC colour modulation by changing over link LK15.

Having said that, a lot of the quality of a colour signal is lost in modulating it like this, and I would be surprised if the results were that much better than those you have now.

Scart connection

HAVING dusted off my Electron I wonder if you could tell me how to use the RGB socket as my television has a Scart socket. All I get from most shops is: "Shouldn't bother mate, we have a more modern set for £XXX."

I do small electrical projects so I know which end of a soldering iron to hold and could get any extra items needed. — T. Scott, Leeds.

● The October 1990 *Body Build* article contained all the information you need to connect your computer to a Scart socket. The kit is still available from Musbury Consultants at £6.00

High v low resolution

IT HAS been my experience that it's not just TV salesmen who may be unable to advise on the dot pitch of all the monitors they sell in order to provide a comparison. It can apply to the man behind the counter in a computer shop.

I was interested to learn that the expected performance of the medium resolution monitor has only marginal advantage over a 14in TV and I wonder why standard resolution monitors are being sold at all.

My own experience has been that a medium resolution monitor was rather worse than the Amstrad CTV1400 that I previously used when I needed to use software with coloured text.

Not only is the resolution marginally worse but there was a shimmer on the text display that I was informed could be eliminated by the purchase of an additional module.

This has been a disappointing experience, and caveat emptor is very much the order of the day. There is a deplorable lack of in availability of performance specifications from which judgements can be made. — Ken



Yeomans, Rickmansworth, Herts.

● The reason that the monochrome mode on the Phillips monitor is described as a high resolution is that by turning off the red and blue guns the pixels are reduced in size by 2/3 and appear to be much sharper.

That's the rationale. Whether you believe it or not is another matter. Advertising is such that yesterday's low resolution monitors are today's standard resolution.

I doubt whether the purchase of a module would stop shimmering, as this is mainly a function of the persistence of the phosphor.

Missing a cog

MY system consists of a Model B with a Torch Z80 dual disc drive. Recently drive A has become faulty. It works on power-up, but having warmed up it won't load anything and comes up with Disc fault at 01/00. There's a sound like cogs in a gear train failing to mesh.

I have been told that drives do wear out, so I opened the casing, swapped the two drives over and, having ensured everything was properly con-

figured, tried it out. Drive B was now faulty, which confirmed my original diagnosis.

I can use the single drive without difficulty when using Basic, but all Torch software requires both.

I have tried to get a replacement but nothing I've found will fit. Torch appear to have ceased trading and the only drives that look like they might fit were advertised back in 1985. I would be very grateful for any help you can offer. — G. Wilkinson, Bradford.

● As you have said, the disc drive itself is at fault. Failure after a short time of working indicates that something is very close to permanent death. Most of the chips on the drive are surface mounted and very difficult to replace.

However, from your description it might just be that the track zero detector switch is faulty. This is an opto-slot detector and could be replaced.

To see if it is, run your drives so that you can see the head movement. If, when it is faulty, the head is banging itself against the end stop this would indicate that it is not detecting track zero. An oscilloscope on the

track zero line of the disc cable could also confirm this. Failing this, if you can't get an exact physical replacement, you could always mount the good drive and new one in another box.

Incompatible external

I HAVE an external 3.5in drive attached to my A3000 which keeps corrupting discs. I bought the drive in 1989 for a Spectrum, and it worked perfectly with a BBC Master. It has its own power supply.

The interface manual says that the step rate should be 8ms, but the drive was on 6ms and I had to set it to 12ms as the next slowest rate. What is causing the corruption and how can I stop it? — A. T. Marketos, Liphook, Hants.

● Giving a drive a longer step time than is needed will do no harm, so you are right to set it to 12ms. The test you must carry out is to see if this drive will format a disc and can then read and write that disc. If it will, you will find that the disc can't be read by your internal drive, which means you have a problem of head alignment on your external one.

Faster access

I AM developing an arcade game for the 8 bit BBC Micro and speed is a crucial factor. A recent article showed how to access the keyboard fast on the Electron, but how is it done on the Master? — Linus Blomberg, Delsbo, Sweden.

● The keyboard is in the form of a matrix which is scanned by software. The trick in speeding up access is to look only at a limited number of keys. On the Master the keyboard is connected to a custom keyboard encoder chip — IC16 — which is linked directly to the systems bus and accessed through the slow data bus.

Write &03 to &FE41 to select the keyboard then access the data direction register at &FE42 to make bit 7 an input and the rest outputs. Then writing to &FE40 will access the key matrix.

Bits 0 to 3 will give the column address and bits 4 to 6 the row address. When this is done reading bit 7 of &FE40 will tell whether the addressed key is pressed or not.

It is best to do all this with the interrupts disabled. For further information see the Advanced Reference Manual of the BBC Master published by Watford Electronics.

Chips with everything

I HAVE a Watford Rom board and the instructions say that two low capacity ram chips can be linked together and act as one larger chip. They then list the link positions for various types of chips.

One of these is the 6264, and in the Watford catalogue there is a 6264LP-8K, presumably the LP standing for low power? Is this the right chip?

Having got the right chip how do I load sideways rom images into the ram bank? — James Dallas, Dorking, Surrey.

● Manufacturers' chip numbers, like computer machine code instructions, contain several fields. There is normally the chip type number, in this case 6264. Then there is a manufacturer's identifier, for example Hitachi chips use HM.

There is also information about the type of package, normally P for plastic and C for ceramic, as well as access speed given as a number after a dash. Finally a letter after the access speed gives information about the temperature range.

Hence HM6264LP-15K would be an Hitachi 8k ram chip with a plastic package, 150ns access time working between 0°C and 80°C. The L might well stand for low power.

This memory will be sideways ram. The board is designed so that any write to sideways rom space is directed into this ram, thus you can load rom images into them by simply using "LOAD name 8000". Some boards have their own specialised commands for loading rom images.

Product: The PCATS Graphics Enhancer Podule
 Price: £179+VAT Archimedes version,
 £189+VAT A3000 version
 Supplier: The Serial Port, Burcott
 Manor, Wells, Somerset BA5 1NH.
 Tel: 0243 531194
 Requirements: BBC A3000 or
 Archimedes range

THE biggest fault with Acorn's ARM-based micros has always been the colour limitations. Coming from the BBC Micro, 4096 definable colours in 2 to 16 colour modes, or a fixed 256 colour mode might seem generous.

But in the professional world you can't do without 16 million colours. Can this new expansion card solve that problem?

My first impression of the board was very favourable because of the quality of its construction. Installation wasn't too difficult: *Solder in a dual-in-line (DIL), plug in the card, connect two video cables and off you go.*

The only noticeable difference between the normal Archimedes video and the Graphics Enhancer version at



Beyond the rainbow

this point is the power-on message. For the nervous, The Serial Port will fit the board into your Archimedes at no extra cost, though you'll be without your machine for two to three days.

The board provides a number of new modes selected from the usual palette icon. Mode 125, for instance, gives a resolution of 1664 by 328 pixels at 4 bits per pixel with 208 characters across the screen and 41 lines. Despite the enormous 267k of ram required, it is extremely fast at updating the screen and moving windows. The accompanying software has a

number of additional utilities. Particularly worthy of mention are the Extended Colour Palette Utility and a new version of the ColourTrans module which allows properly written multi-tasking software to function correctly with the new colours.

With hardware added and cables connected to the Video Out and In ports you are ready to run. A relocatable module is loaded when the machine is switched on and this controls all the video output to the monitor – whether you have a standard or multi-sync system. This module also

Taking the lid off his Archimedes, Geoff Gallacher revels in a new world of modes and colours

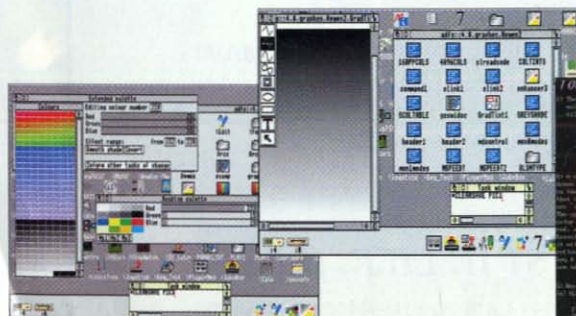
contains a list of star commands to control the video effects and complementary set of SWIs, further information on which can be found in the Technical Reference Manual. This, though costing a little extra, is a must if

you want to learn to program the video displays.

The technology used on this board allows up to 16 bits per pixel – 65536 colours – from a range of 16 million. The Desktop will only allow you a 8 bits per pixel maximum but you can still choose these from the 16 million rather than the 4096 range of colours provided by VIDC.

Using these new modes and colour ranges, artwork produced should be near photographic quality.

You'll also find that this board supports Atomwide's VIDC-Enhancer, all the new modes invented by Computer Concepts for Impression and Beebug





for Ovation plus a few modes of its own which are all DeskTop compatible. In fact almost all screen modes – 127 – have been defined, although some are only available on the A540.

Summing up

With the promise of new programs to take advantage of the new high resolution modes and extended colour palette, this board is an essential peripheral – especially if you use art or graphics packages.

If you ever need to import some of the high resolution images which can be found on most of the bulletin boards the addition of the Graphics Enhancer to your Archimedes can provide a professional quality video output for a very realistic price.

The video output is outstanding on the standard Acorn/Philips colour monitor, but using all the modes to the full you'll need a multi-sync monitor for truly professional results.

The Serial Port are working on an enhancement and also a professional system supporting full genlocking and transparencies. I can't wait.

Definitions

Resolution: The number of individual dots which the video chip (VIDC) produces for each scan line. Described as x pixels (picture elements) by y pixels. The x value is how many pixels are seen horizontally across the screen and the y value is how many are seen in the vertical plane.

The standard VIDC chip running at a clock frequency of 24MHz can produce a number of different resolutions from 160 horizontal pixels by 256 vertical pixels to 640 by 512 pixels. Generally the lower the resolution the bigger the pixels appear on screen.

With the Graphics Enhancer board fitted, the highest resolution is increased to 1664 by 328 pixels and the VIDC clock is increased to 36Mhz. Although it is worth noting that some VIDC chips run at up to 48Mhz.

Bits per pixel: The number of bits the colours are stored in. If the

selected mode has 4 bits per pixel it can display one of 16 different colours for each pixel – 0000 to 1111 in binary. If the mode uses 8 bits per pixel it can use 256 different colours for each pixel – 00000000 to 11111111 in binary.

The standard VIDC chip can display up to 256 colours for each pixel and as few as two colours – in Mode 15 or 0 respectively. The Graphics Enhancer can be programmed to display up to 65536 colours per pixel when set to 16 bits per pixel. Unfortunately this mode isn't DeskTop compatible although the results are stunning.

Palette Entries: The number of possible options for any one of the colours of an individual pixel. The standard VIDC has a *colour look-up table* with 4096 entries. This means that any pixel can be coloured in any one of 4096 colours across the spectrum from black to white.

This is much better than most other

computer systems can provide, but the Enhancer Board extends this still further to over 16 million different colours, the standard for professional graphics workstations.

Perceived resolution: What the human eye can see and resolve in the mind. Assuming you use the VIDC colour look-up table you'll be able to see a colour image 640 by 256 pixels in 16 colours when in Mode 12. But if there is another image alongside with the same resolution of 256 colours in Mode 15 you'll perceive the second image to be of better quality.

Using the Graphic Enhancer's colour look-up table on a third image of the same resolution but with a better range of 256 colours this image will look sharper still.

Even reducing the resolution of the other image with 65535 colours it will be seen to be better than all the others without taking any more disc space than the third image.

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SPEECH output from a micro – the idea of a machine talking back to you – has always had a science fiction connotation. Unfortunately that particular concept also requires an intelligent machine and the truth of speech output is far less romantic.

Nearly all of the many speech units produced since before the birth of the 8 bit BBC Micro had to be sent phonemes to speak. A phoneme is a sound that can be made by a human voice system and it has very little to do with the alphabet.

For example the word *emphasise* breaks down into:

e	as in egg
m	as in mother
f	as in father
a	as in father
s	as in sing
i	as in i
z	as in zoo

Notice how the two s's are pronounced differently depending on

Arc Chat Show

Three speech synthesisers have appeared in the Archimedes market – Steve Turnbull investigates

their position.

The next breakthrough pre-1982 was the Votrax Type'nTalk which plugged into the serial port and behaved like a printer. Quite a sophisticated unit, it managed to translate written English into understandable speech using a set of built-in rules and an exception dictionary for special cases.

It had an American accent, but this was a small price to pay for the ease of use – although it could take a little while to get tuned in to its pronunciation.

Apart from the infinite vocabulary speech units, some fixed vocabulary devices provided sampled sounds which could be output directly. The famous Kenneth Kendal chips for the BBC Micro were of this type, but they never really caught on.

The tiny vocabulary limited their application – unless you had someone who was dedicated enough to use the basic building blocks of these chips to produce new words.

Progress for micros then stopped as the necessary technology existed

for all the specialised tasks that required speech output, like computer software for the visually-impaired.

Then Superior Software launched Speech! for the BBC Micro. This revolutionary piece of software required no additional hardware, producing its sounds by built-in sound chips.

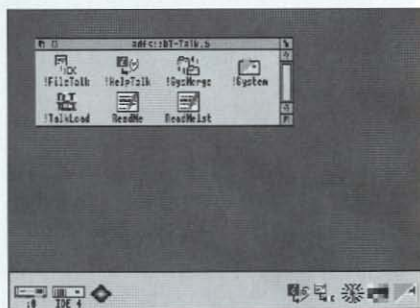
Now three companies have released similar software for the Archimedes – with a fourth waiting in the wings. So let's listen to what's available.

Product: DT-Talk
Price: £15.00

Supplier: DT Software, 13 Northumberland Road, Leamington Spa, Warks.

THIS was the first of the speech synthesisers to hit the streets, back in September 1990. The package is composed of an A6 booklet of 16 pages and the disc of software. There are three major applications: !TalkLoad, which loads two modules, VoiceSynth and TextTalk, !FileTalk, which is an icon bar-based program which simply speaks text files that are dragged to it, and a PD application called !HelpTalk which will announce application help files.

The TextTalk module provides the higher level entry point with the single *Say command. It takes text and converts it to phonemes which are then passed to the VoiceSynth module to be spoken via the single SWI command VoiceSynth_Allophone – an allophone is an actual sound. The SWI



The DT-Talk disc contents

command accepts a pointer to a string containing a code for the allophone to be spoken.

It is also possible to drive the VoiceSynth module via SOUND commands, like this:

```
*ChannelVoice 1 VoiceSynth
*SOUND 1 0 0 255
```

The duration of the sound is used for the particular allophone. Unfortunately although the booklet lists the available sounds it doesn't

say which numbers to use for them.

The final page of the booklet is devoted to the license conditions of the software which essentially says that you are allowed to use it on your non-networked machine as long as you don't rip it off.

Sound quality is quite poor, being extremely artificial and mechanical. You can use the allophone entry point to produce more comprehensible speech, but that rather defeats the object of the text-to-speech translation.

Product: SpeechSystem
Price: £25.00 (inc. P&P)

Supplier: PEP Associates, 55 St Pauls Drive, Chatteris, Cambs PE16 6DG

NEXT out of the programmer's bag came the SpeechSystem, comprising a much more weighty 55 page A5 manual with nice page styling and a comprehensive index. The single disc contains three applications and a couple of demos.

The applications are !PEP-Lib which contains the modules for the SpeechSystem, !PEP-Text which will speak text files and !PEP-Word for creating words that require special pronunciation.

The PEP software is protected by an ID system: When it's first run you must enter a personal identity string which is then encoded into the software.

A copyright message comes up when the speech modules are loaded, which



is fine. My only complaint is that the window stays up too long. All the software and the manual demonstrate a high level of professionalism but some details have been missed. IPEP-Text loads on to the iconbar and when a text file is dragged on to it brings up a window containing the words with a video-style control panel. There is no word-wrap on the text, so paragraphs extend horizontally until the next Return.

IPEP-Text has extensive additional hooks into the operating system allowing it to intercept the interactive help, speak letters or complete words as they are typed. It can also speak text under the mouse pointer as long as it's in the system font.

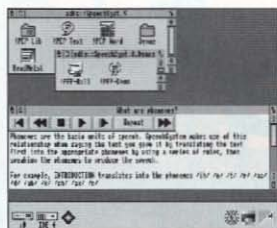
Further options allow you to disable specific characters from being spoken when either read or typed. I'm not sure of the practical advantages of these hooks as a window-based multi-tasking environment is not really the best place for this type of aid. A second, optional, module allowing these hooks to be included would have been more appropriate.

IPEP-Word allows an exception dictionary to be built up, but surprisingly no examples are provided in the initial system. Editing is provided by a menu dialogue box which vanishes if you click anywhere else, which I found irritating.

Also the editing method was extremely awkward and it was impossible to have the word spoken in its text form to see what corrections might be needed, if any.

The demos provided include IPEP-Bull, the infamous !Bullwink modified to speak its words of wisdom, and IPEP-Demo which includes a version of IPEP-Text on four specific subjects.

The SpeechSystem has three star commands: Utter, Shutup and SpeechInfo. The first speaks the string that follows, it doesn't translate strings of digits into their ... hundred and ... type equivalents. Phonemes can also



be included enclosed in double curly brackets. Speech is processed in the background and the "Shutup" command forces it to cease while SpeechInfo provides the current status.

One point of note is that the Atomwide VIDC Enhancer does naughty things to the sound system. Alone among the speech software SpeechSystem allows you to compensate for this.

For the programmer there are 12 SWI calls allowing access to all the main features of the system, including the ability to convert a text string into its phoneme equivalent without it being spoken.

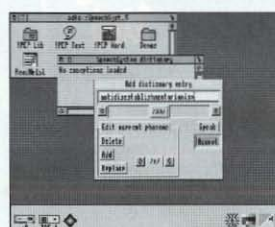
An interesting pair of SWIs are RegisterUser and DeregisterUser, which the module employs to keep track of the number of applications using it.

When a user starts up it registers with the module and on closedown it deregisters, and it is also given the count of remaining users. If this value is zero – no more users – the quitting user can also RMKill the module.

This helps to keep the machine's memory clear of unwanted modules. It's a practice that could certainly be emulated by other software writers.

The manual contains a highly legalistic two-page licence agreement which, if you run the ID installation process, you are assumed to have conformed with.

The speech quality of SpeechSystem is better than that of DT-Talk, being slightly more comprehensible – but it's still rather stilted and mechanical.



Product: Speech!
Price: £19.95
Supplier: Superior Software, P.O. Box 6, Brigg, S. Humberside DN20 9NH.
Tel: 0652 58585

F fairness came into business you could say that Superior have an unfair advantage – the author of Archimedes Speech! wrote the original BBC Micro Speech! so he had a head start. But what it really means is that this should be the best of the three packages. So let's see:

What you get looks like a game. The packaging is the same as for all Superior Software's products, a plastic case with an inlay and a disc. The inlay in this case is crammed with instructions, but that is all the written documentation provided.

On the disc are four applications: !Speech! which contains the code, !Sp_Demo, !Sp_Dict and !Sp_Spell. The demonstration is a highly effective, humorous and graphically excellent production with the Speech! Genie speaking on screen with lip movements correctly synchronised – it's a lot better than most TV cartoons.

!Sp_Spell is a spelling tester, once again using the Genie, this is, of course, the way spelling testers ought to be – the word is spoken and the testee types in the answer. There are a number of word sets and you can input your own.

Unlike the other two programs, the pronunciation rules for !Speech are not fixed. Using !Sp_Dict you can alter the rules if you prefer a different accent – or a completely different language. There's no exception dictionary, it's all included in the !Sp_Dict.

The process for altering the rules is not quite so straightforward: Having printed out the !Sp_Dict.Help file you can load the file !SP.Dict.Dictionary into !Edit and begin to make alterations.

Considering the amount of time that has clearly been spent creating the demo and spelling programs I'm amazed at how low-tech this solution is.

Once the changes have been made you must double-click the !Sp_Dict application and a new version of the !Speech module is created

ready to be dragged to some location other than the original disc.

The programming interface is very extensive with controls for altering the speed and pitch of the spoken text, as well as modifying the way the mouth forms the words, thus changing the style of pronunciation.

Documentation is limited on this, but the !Speech!.Help file contains just enough information, although there's no hand-holding.

The speech quality is vastly superior to the other two systems and much more realistic. The wide range of controls make it possible to produce singing as well as a multitude of other effects. Unquestionably the best buy.



Name	Output quality	Output controls	Rules	Exceptions	Documentation	Support software	Price
DT-Talk	Poor	None	Fixed	None	Poor	Poor	£15.00
SpeechSystem	O K	None	Fixed	Alterable	Excellent	Excellent	£25.00
!Speech	Good	Extensive	Alterable	Alterable	Poor	Good	£19.95

How the products compare

The Sampler and MIDI Card

£69 exc VAT - Econet Version

The sampler and MIDI card opens up the exciting world of sound manipulation and control at a price that allows everyone to join in.

The card fits neatly in the Econet socket inside your machine thus leaving your podule slots free for other upgrades. It has no unsightly cables protruding from the machine - all leads connect via an adapter directly to the standard Econet socket.

Even though the cost may be low, specification and quality haven't been skimmed on. The board is an 8-bit sampler with variable sample rate capable of sampling at up to 250 KHz with input via a 3.5mm jack allowing connection to Hi-Fi's, CD players, Walkmans etc. The software supplied supports a range of features including over-sampling, sample rate conversion, and software filtering. Waveform editing is possible with facilities to view the waveform (including real-time analysis), fade in/fade out, and cut and paste features. The samples produced are perfect for use in other packages such as Tracker and Armadeus.

The MIDI side provides 16-channel MIDI IN and MIDI OUT and the supplied software emulates the latest version of Acorn's MIDI software. This allows it to work with programs that can run using Acorn's podule and their software.

Tracker

£49.95 inc VAT

Tracker is the perfect compliment to the Sampler and MIDI card. It is a full 8 channel sequencing package that creates stand-alone music modules which will play on any Archimedes without any need for extra hardware. Using the supplied samples (over 150 of them!) or your own, you can create complex pieces of music using Trackers many advanced features including:

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Acorn User February 1991

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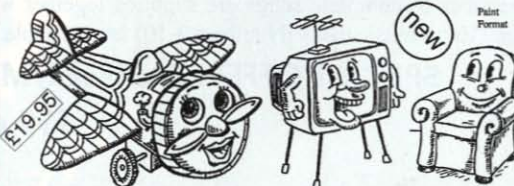
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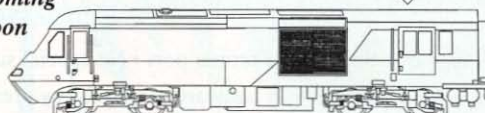
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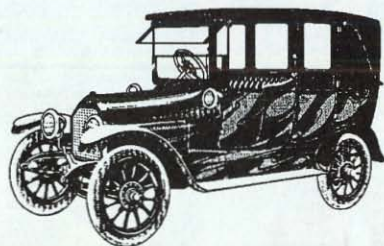
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Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer (while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030

Offer Price: £475

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. New RISC OS Version

Only £15

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Up to 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
• A300/A3000 £21 • A400 £25

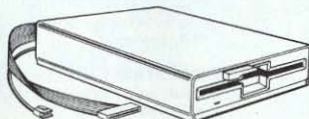
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) £399 (carr £7)

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beeplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during June

ADD-ONS & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I (No VAT)	£14
Master Reference Manual II (No VAT)	£14
Master Advance Ref Manual (No VAT)	£17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Desk Top Publisher

Acorn's Archi DTP Package	£125
Impression 2 DTP Pack	£135
Impression Junior	£79
Tempest DTP Package	£95

Archi Wordprocessors

Pendown Archi	£49	Archie Spell Master	£39
Wordwise + Disc	£24	PD Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£24	Graphic Writer	£23
1st Word Plus - 2	£69	EasyWord	£30

Databases

AlphaBase	£36	Multistore	£195
Knowledge Organiser	£45		

Spreadsheets

Intersheet Disc	£24	Viewsheet	£45
Signsheet	£39	Schema	£92

Business Graphics

GammaPlot	£39	Signaplot	£39
Interchart Disc	£20		

Integrated Packages

• Logistix	£79	• Pipedream 3	£119
• Desktop Office - Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications			£98
• Desktop Folio - Wordprocessor, Desktop & Interactive Publishing. Ideal for school environment.			£85

Watford's Scottish Dealer

We are pleased to announce the appointment of Messrs Computer Depot as Watford's official Scottish Dealer. The full range of our BBC/Acorn products is now available from their Dundee, Edinburgh & Glasgow shops. Their technical staff will be very happy to discuss all your peripherals' requirements.

Education Software

- Advanced Folio: 7-14 years. Has the simplicity of a basic wordprocessor with the presentation quality of a Desk Top Publisher £38
- Colourproctor & Numberproctor: 4-7 years. Flying start in pre-reading and pre-number skills
- Colourproctor includes 7 programs to develop matching, sorting, coordination, letter & word recognition £28
- Numberproctor: Includes 8 programs to develop memory, sequencing, logic, number, more and gone away, word order and rhythm skills £28
- Best Four languages 5-11 years: Four best selling programs which encourage children to work together to improve their linguistic ability £33
- Hands on Spelling 5-11 years: Promotes a visual approach to mastering spelling, linking the skill with other National Curriculum areas as hand writing, talking and reading. £30
- Asian Folio - Gujarati 80T £45
- Best Four Languages £35
- Best Four Maths £35
- Frieze 7-16 years £37
- Kaleidoscope 7-16 years £37
- Merlins Castle £22
- Maths 9-13 years £25
- Number in the National Curriculum £55
- Screenprint pack of 5 5-16 years £150
- Time Traveller 7-16 years £40
- The Lost Frog £22
- World Map Study 7-16 years £35

(More Educational software on page 10)

Continued → → → → → → → → →

Archi A4 Scanner



This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the IHELP application on the Acorn applications discs.

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:	
Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

Z88 Portable Micro



£185

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£18.00
• 128K RAM Pack or 128K EPROM Pack	£42
• 512K RAM Pack	£175
• Z88 Eprom Eraser Unit	£33
• Z88 Spellmaster for Pipedream	£51
• Z88 Carrying Case	£8
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£25
• Z88 to Archi Link	£15
• Z88 to BBC Link	£20
• Z88 to PC Link II	£30
• Z88 to Macintosh	£52
• Z88 Mains Adaptor	£9
• Z BASE	£56
• Z TAPE	£42
• Z TERM	£42
• Z88 Modem	£149

Archi Real-Time Digitiser



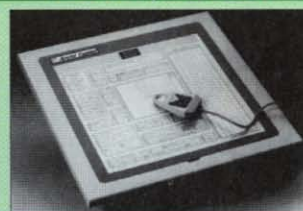
Now supplied with NEW RISC OS Version Software

Watford's Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus £125

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible - Use ADFS on our DDFS board.
- Tube host Code - No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing - no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation - ensuring compatibility with almost all software.
- New low profile - small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations - BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk - Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00**.

• SPECIAL PRICE	£44.00
• DDFS Manual	(No VAT) £6.95
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M - Diskettes

3M - SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor

• 10 x 5.25" S/S D/D 40T (744)	£5
• 10 x 5.25" D/S D/D 40T (745)	£5
• 10 x 5.25" S/S D/D 80 Track (746)	£7
• 10 x 5.25" D/S D/D 80 Track (747)	£7
• 10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT	£11
• 10 x 3.5" S/S D/D 40/80 Track	£7
• 10 x 3.5" D/S D/D 40/80 Track	£8
• 10 x 3.5" Double Sided High Density	£13

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. We are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• 10 x M3 3.5" D/S D/D 80 Track	£7
• 10 x M9 3.5" D/S High Density	£12
• 10 x M4 5.25" S/S D/D 40 Track	£5
• 10 x M5 5.25" D/S D/D 40 Track	£5
• 10 x M7 5.25" D/S D/D 80 Track	£7
• 10 x M8 5.25" D/S H/D Hi-Density	£12
• M2 3" Double Sided	£2.50 each



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted.

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

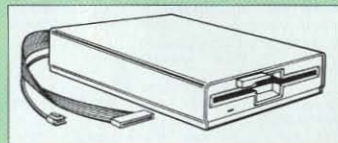
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. **Ideal for Schools & Colleges.**

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"



Our Disc Drives conform to BS415

Type	Description	
Disc Drive without PSU		
• CLS400S:	Single, 40/80 track 400K Double sided Drive	£72
• CLD800S:	Twin, 40/80 track, 800K Double sided Drives	£142
Disc Drive with PSU		
• CS400S:	Single, 40/80 track, 400K Double sided Drive	£82
• CD800S:	Twin, 40/80 track, 800K Double sided Drives	£155

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer



- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DDFS Operating manual

Bargain at Only £119 (Offer valid until stocks last)

3.5" DISC DRIVE

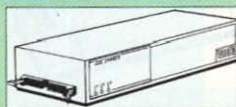


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
Disc Drive without PSU		
• CLS35:	Single Disc Drive, 400K	£62
• CLD400S:	Twin Disc Drives, 800K	£109
Disc Drive with PSU		
• CS35:	Single Disc Drive, 400K	£83
• CD35:	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drive Sharer



(Ideal for educational establishments)
A low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DDFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand



- CDPM 800S - Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

- DP35 800 - Same as above except, one disc drive is a 5.25" and the other is 3.5".

£154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

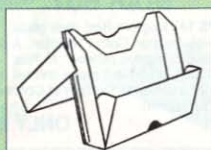


Gives double protection - Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 - holds up to 50 5.25" discs **£4.95**
- M85 - holds up to 95 5.25" discs **£6.95**
- M25+ - holds up to 25 3.5" discs **£4.95**
- M50 - holds 50 3.5" discs **£6.50**
- M10 - holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



- Holds up to 10 x 3.5" Discs. **£1.50**
- Holds up to 10 x 5.25" Discs. **£2.00**

Dust Covers (For our Disc Drives)

- Single CLS (without PSU) **£3.20**
- Single CS (with PSU) **£3.25**
- Twin CLD (without PSU) **£3.85**
- Twin CD (with PSU) **£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50		£52 for 100

Continued → → → → → → → →



12 months
FREE
maintenance
on site

Microvitec Monitors

- 1431 - Standard Resolution Monitor £169
- 1451 - Medium resolution, suitable for word processing in mode 0 £209
- Cub3000 Medium Res for A3000 £189
- 1441 - High res, exceeds the capabilities of the BBC Micro £359
- 2040 CS 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- Touchtec 501 Touch Screen £239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

- Eizo 9060S £389 • NEC 5D £1299
- Eizo 9070S £579 • Taxan 770LR £379
- NEC 2A £255 • Taxan 775 £375
- NEC 3D £345 • Taxan 795-PC £425
- NEC 4D £679 • Taxan 875 £725
- VIDC Enhancer Board £25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Philips

- BM7502 12" Hi-res Green Monitor £70
- CM8833 14" Med. Res Colour Monitor £178

STAR BUY

- PHILIPS 14" Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £176

- Dust Cover for Philips Monitors £6
- (Securicor carriage on Monitors £7)

Spare Monitor Leads

- BNC Lead for Zenith or Philips £3
- Skart Monitor Lead £5
- RGB lead for TAXAN Monitors £3
- Archimedes Colour Monitor Lead £7.50

Anti Glare VDU Screen

These screens are extremely effective, easy to install. 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Canon Bubblejet Printers

- | Printer | CSF | D'ble | Ink | Cart |
|---------|------|-------|-----|------|
| BJ10E | £205 | £54 | | £18 |
| BJ300 | £354 | £88 | £65 | £12 |
| BJ330 | £399 | £110 | £79 | £12 |

- Spare Battery pack for BJ10E £33

NEC Pinwriter Printers

- P20 £198 • P70 £485
- P30 £257 • P90 £655
- P60 £379

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

- Standard A3 Keyboard with BBC Software £143
- Standard A4 Keyboard with BBC Software £117
- Archi A3 Keyboard £144
- Archi A4 Keyboard £118

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

- # Desk Jet 500 £309 • Paintjet XL £1125
- Desk Writer (Mac) £482 • Quiet Jet Plus £359
- Desk Jet Cartridge £15 • HP Think Jet £239
- Paint Jet Colour £589 • Rugged Writer £339

Now 3 years extended Parts & Labour warranty

- Paintjet Cartridges Black £19; Colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epsom FX Emulation Cartridge for Desk Jet £59
- HP Apple Talk Interfaces for £299 • Paint Jet £90A
- Scan Jet £299 • Paint Jet £19.75
- Desk Jet Unlimited (Book No VAT)

Panasonic Printers



FREE with every KX-P1081 & KX-P1180 Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros (please specify)

- KX-P1081 9pin 80col. 144/28 cps £122
- KX-P1180 9pin 80col. 192/38 cps £129
- KX-P1123 24pin 80col. 192/63 CPS £158
- KX-P1124 24pin 80col. 192/63 CPS £215
- KX-P1624 24pin 132col. 192/63 CPS £299
- KX-P1695 9pin 132col. 330/86 CPS £299
- KX-P1654 24pin 132col. £429

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

- KX-P1592/1595 (P32) £175 KX-P1540 (P35) £175
- KX-1124 (P36) £85 KX-P1180 (P37) £79
- KX-P1624/1695 (P38) £124 KX-P1123 (P37) £79

Buffers

- P12 4K buffer Board for 1081 £55
- P42 32K buffer Chip for 1592/1595 £16
- P43 32K Buffer Chip for 1540/1124/1180 £16

Serial Interfaces

- P17 P1081/1592 £32 P19 P1124/1180 £55

Citizen Printers

- 120D Plus £96 124D Printer £138
- Produt 9 £205 Produt 24 £225
- Produt 9X £245 Swift 24# £205
- Swift 9 £138 Swift 24X £279
- Produt Cut Sheet Feeder £120
- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13

Special Offer this month - A FREE Colour option cartridge with every Swift 24 printer purchased from us.

Star Printers

- LC10 9pin 80col. 144/36 CPS £112
- LC15 9pin 136col. 180/45 CPS £180
- LC24-10 24pin 80col. 180/60 CPS £150
- LC24-15 24pin 136col. 200/67 CPS £295
- *FR10 9pin 300/76 CPS 31K 16 fonts £229
- *FR15 Wide carriage version of above £290
- *XB24-10 24pin 80col. 240/80 CPS £299
- *XB24-15 24pin 80col. 240/80 CPS £365
- *XB-24 Colour Kit £29
- LC-200 Colour 9pin 80col. 180/45 CPS £158
- LC-24-200 24pin 80col. 222/67 CPS £189
- LC-24-200 Colour 24pin 80col. 222/67 CPS £222

*FREE Colour Ribbon with these printers

Star Accessories

Cut Sheet Feeder

- LC10/200/24-10 £65 LC15/LC24-15 £125
- XB24-10 £80 XB24-15 £139

Serial Interfaces

- SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
- 8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

- LC-200; LC24-200; LC24-200 colour £29

Buffers

- 32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

- LC10; LC10-II; LC15 Black £4; Colour £6
- LC-200; LC24-200 Black £5; Colour £12
- XB24-10; XB24-15 Black £5; Colour £12

Laser Printers

- Canon LBP-4 4ppm £655
- Canon LBP-8 IIIIR 8ppm £1505
- Canon LBP-8 IIIT 8ppm £1389
- Epson EPL7100 6ppm £689
- HP Laserjet III 8ppm £1025
- HP Laserjet IIID 8ppm £1539
- Laserjet IIIP 8ppm £689
- Panasonic KX-P4420 8ppm* £648
- Panasonic KX-P4450* 11ppm* £1025
- Panasonic KX-4455 Postscript 11ppm* £1699
- Qume Crystal Print Publisher 2 £1899
- Star LP-8 III £979
- Star LP-8 Star(post)script £1195
- Star LP-4 4ppm £705
- Star LP-4PS Postscript 4ppm £875

* Now 2 years warranty

Laser Toners

- Canon 2 & 4 £54 Laserjet II & IIP £55
- Epson GQ £18 Laserjet III £75
- Star LP-8 £69 Qume Crystal £56
- KX-P4420/50 £22

Laser RAM Upgrades

- IIP & III 1MB £74 • EPL7000 2M £365
- IIP & III 2MB £109 • GQ5000 512K £95
- II & IID 1MB £76 • KX4420/50 1M £115
- II & IID 2MB £112 • KX4420/50 2M £159
- II & IID 4MB £299 • KX4420/50 4M £349
- Canon LBP4 1M £175 • Star LP8 1M £143
- Canon LBP8 2M £150 • Star LP8 2M £285

Laser Drum & Developer

- Epson Drum GQ5000 £93 EPL7100 £129
- Panasonic 4420 Drum £60 Developer £59
- Panasonic 4450 Drum £93 Developer £80
- Qume Drum £76 Developer £56

Jetpage Postscript Cartridge

- HP IIP/III £255 IID & IIID £265

NEW - HP Laserjet

- Various Font Cartridges £45
- Superset Font £195

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

**Watch this space
for our
NEW LAUNCH
for Archimedes
micro products**

Epson Printers

DFX5000	£1089	LQ860 Colour	£465
DFX8000	£1999	LQ1050+	£475
EX1000	£456	LQ1060	£599
FX850	£283	LQ2550+	£709
FX1050	£358	LX400	£109
FX1060	£599	LX850	£150
LQ400	£166	SQ850	£439
LQ550	£209	SQ2550	£645
LQ850+	£385		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	£69
EX800/FX800/850/LQ800/850	£130
FX/LQ 1000/1050/SQ850	£159
LQ 2550	£390 SQ2550 £390

Tractor Feed for

LQ800 £44; LQ850/FX850 £69; LQ1050/
FX1050 £85; LQ2500 £90; LQ2550 £90.

Accessories

• EX800/1000 Colour Option	£45
• EX800/1000 Colour Ribbon	£14
• LQ2500 Colour Option	£65
• Multifont Card for LQ550/850/1050	£95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

• HP7440	£425	• HP7475	£599
• DXY1100	£515	• DXY1200	£645
• DXY1300	£845	• DXY2500	£2375
• DPX3500	£3289	• Sketchmate	£379
• Roland plotter Pens, Fibre tip			£7.50

Roland SketchMate

The Intelligent Graphic Plotter

It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. Specifications: Plotting area: 297 x 216mm. Number of Pens - 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

£379



**CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383**

Listing Paper (Perforated)

• 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
• 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
• 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£21
• 1,000 Sheets 15" x 11" Fanfold Paper	£9
• 2,000 Sheets 15" x 11" Fanfold Paper	£16
• 1,000 Sheets true A4 Fanfold Paper 70gms	£11
• 2,000 Sheets true A4 Fanfold Paper 70gms	£21
• Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £145 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	-
BBC Micro	-	£3.50
BBC Master	-	£4.00
Archimedes Micro pair	-	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	-
FX/MX/RX100/1000	£3.95	-
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	-
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet	-	-
Cartridges (set of 4)	£9	-

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180	£7
P140 for KX-P1540	£8
P145 for KX-P1624	£10
Colour Ribbons for KX-P1081, 1592 & 1595	£9.95 each
Brown, Blue or Red	

Professional Printer Stand



effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

**80 Column version £24 (carr. £3)
132 Column version £29 (carr. £4)**

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case. (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£32	£36

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.

Centronics £18; Serial £17
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£40	£45
4 to 1	£62	£59
8 to 1	-	£89

256k Multi Spooler

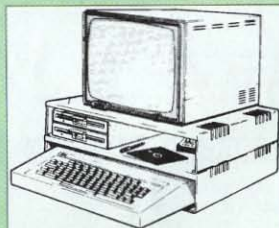
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

• 2 In/2 out	£135	• 4 In/2 out	£169
• 8 In/1 out	£199		

Compact Converter Units

Serial to Parallel £36 Parallel to Serial £37

Plinths for the BBC B & Master 128K Micros

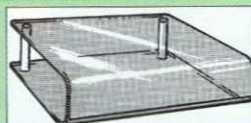


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	£13
Double BBC Plinth	420 x 310 x 210mm	£24
Single Master Plinth	490 x 310 x 105mm	£14
Double Master Plinth	490 x 310 x 210mm	£26

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	£16 (carr £3)
136 Column version	£20 (carr £4)

Continued → → → → → → → →

QUEST MOUSE Mk III



- Quest Mouse III & Quest Paint £59
 - Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £89
 - Quest Mouse III only £30
 - Quest Paint Software only £34
 - Quest Font Disc (22 Text Fonts) £15
 - Quest Mouse Mat (Red or Blue or Green please specify) £3
 - Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18
- (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principle even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version £27
QT-20 Archimedes Version £30

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible) £45
RB2 including Quest Paint £75
RB2-A for Archimedes £46

THE NEW Mk III AMX MOUSE

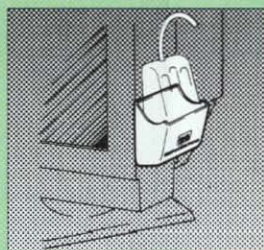
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

- MOUSE MAT £3
- AMX MOUSE ONLY £29
- AMX SUPERART Package £34
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £32
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £55
- AMX XAM Educational £15
- AMX EXTRA EXTRA £16
- AMX MAX A gem of desktop (ROM) £20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.

It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

- Software pack for BBC Micro £33
- Software pack for the Master £39
- Admin Xtra Disc Utility £13
- Fonts N Graphics Disc Utility £13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine. Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer. The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135



Winner of the BBC Acorn User 1990
Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer drivers. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a Turbo DFS which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, ellipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be - it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

* Pictures may also be 'grabbed' from a video source by using the Watford Beeb Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Meftec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.

Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.

Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds - print speed up to 5 times faster than typical Laserjet compatibles - uses outline fonts so that any font can be scaled to any size - works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, IDraw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer £325
- LPB4 Printer plus High Res Card £1025

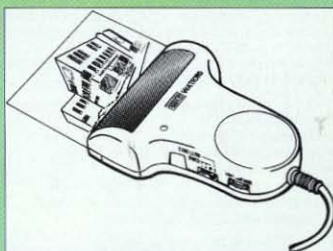
(For demonstration, call in at our retail shop)



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (module) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are:

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.

X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version £149

AHS-3 Archi A3000 Version £175

Continued → → → → → → → →

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector. Key points to note about this new addition to the Watford range of products are:

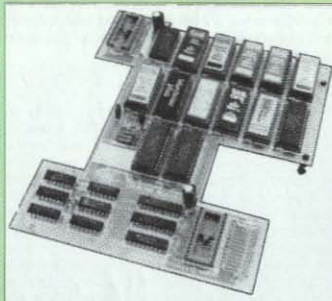
- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: £29 (carr £2)

Optional Battery back-up fitted

£3

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBC's capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35

Battery Backup fitted £39

Battery Backup only £3

16K Sideways RAM £8.50

(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

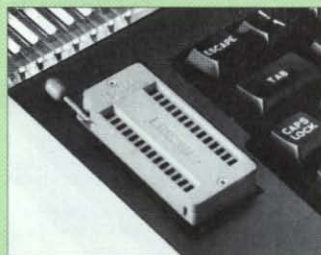
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at £22 (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY £18 (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

- Complete System £11
- Spare Cartridges £2.75
- Spare Rack £1.65

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin £9; Quad £14

Commander Joystick

Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Launch Price: £15



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobol, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: £69 (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price: Aries B-12 £36
Aries B-12C £5

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128

£25

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Epprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD & F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM £48
- ROM/RAM card with 64k dynamic RAM £65
- ROM/RAM card with a massive 128k dynamic RAM £109

(carriage on ROM-RAM Card £3)

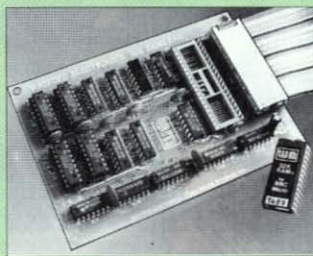
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit £9
- 16k Dynamic RAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches £2 each
- Complete ROM-RAM board All options installed £115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer - type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free - 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

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We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every **WORDWISE PLUS** package bought from us.

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The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

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- Text transfer options.
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- Search and display in preview mode.
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- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc interface in your Micro)

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MINI OFFICE II

DISC Version for BBC B & B+	£14.00
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(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, Hi80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

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OFFICE MASTER



CASHBOOK - A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

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Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top £7 (carr. £3)
Angle poise £12 (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities - he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

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New Release

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modern are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quickly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way - from Acorn to MS-DOS, or from MS-DOS to Acorn. 'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered. 'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc. and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work - even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: £14.95 (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed. Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats: INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

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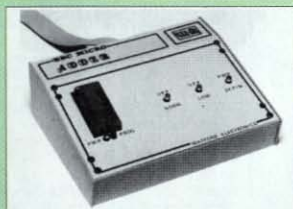
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These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10 MHz.

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Computer Shopper Jan. 1991

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An example scanned picture, reproduced actual size.



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HAVE you ever wondered how the games experts create those amazing sideways scrolling shoot-'em-ups? Well now you can join their ranks.

The listing shown here will enable you to create landscapes out of a matrix of sprites and scroll through them without so much as a flicker.

Most scrolling techniques you see in games like Repton use the hardware to scroll the screen and update it while it's being viewed, which results in flicker.

But this method is better. It uses two screens, one being displayed while the other is kept hidden and updated.

The algorithm goes like this:

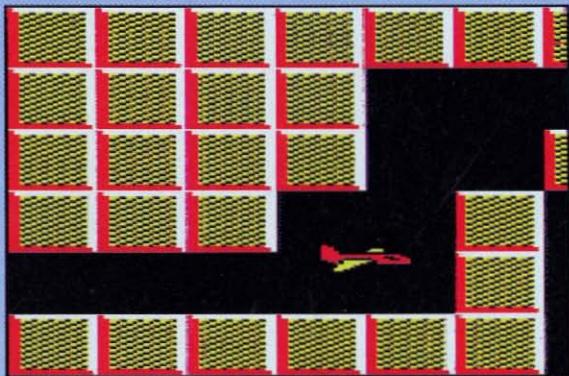
```
Screen 1 = X
Screen 2 = Y
REPEAT
  Display X
  Hide Y
  Update Y
  Hide X
  Display Y
  Update X
UNTIL FALSE
```

If you play a hard scrolled game you will often notice flickering at the edge of the screen every time it scrolls. This is mainly caused by the wrapping around of data that is about to be scrolled off the screen.

After it has wrapped around to the other side there is a short delay before it can be overwritten with the new screen data.

Even though flicker is produced, this method is very fast because only one column of sprite data needs to be re-drawn each time the screen is scrolled. Flicker areas can be blanked out but this is not easy and requires precision timing.

Another disadvantage is that any sprites you decide to have on the screen which are separate from the scrolling map - for example a spacecraft, bouncing monsters, the score and so on - will be scrolled too. To stop this happening all foreground sprites have to be moved against the direction of the scroll. The software



scroll avoids this nuisance but does have other drawbacks, the most noticeable being the amount of processing time as the entire screen is re-drawn one scroll position onwards.

It's not practical to use this technique with a full-sized Mode 2 screen because 40k would be needed. However it can be done by using two half-size screens.

For simplicity the routine here works in Mode 5. This means that you can have larger maps because of the lower claim on memory and the re-drawing time is reduced because there are fewer bytes to draw. The main disadvantage is that the minimum scroll distance is four pixels horizontally because each byte represents four pixels. In Mode 2 we could have scrolled two pixels at a time which would have looked smoother, though slower.

The routine has several constants which can be changed to tailor the routine to your needs. The most important ones are *MapDepth* and *MapWidth*, which specify the size of the map in sprites. If you make them smaller the screen scrolls more smoothly.

MapTopGap and *MapLeftGap* allow you to set the size of the gaps to the left of the scroll area and above it, measured in sprites. This makes it easy to centre a small scrolling area into the middle of the screen. *SprWidth* and *SprDepth* specify the size of the individual sprites.

The pattern of sprites scrolled across the screen is governed by the

contents of the map table. This can be found towards the end of the listing.

It is important that you have *MapWidth* characters in each line of the map data or else you will get a garbled mess of data scrolling across your screen. Notice that the table is rotated 90 degrees when it is plotted on to the screen as sprites.

Each sprite has an Ascii code, so to make a new map just place the Ascii characters where map data should be, in the desired order. The sprite corresponding to the Ascii character can be found by referring to another table called *sptable*. If you want to add new

sprites it is simply a matter of putting their character symbol and start address in this table. You will then be able to use the symbol in the map data.

The routine uses standard column by column sprite plotting so most of the sprite editors around, including the one in the Arcade Game Creator package, should be able to cope as long as you remember to save the sprites out in the correct size. The default size is set to 4 columns by 32 rows.

You can have a maximum of 85 sprites in the map, if you can fit them into memory. You will only be able to fit a small amount in at the moment because of the space used up by the Basic program. To get round this I advise you to get hold of a disc-based assembler and perhaps the Public Domain small C compiler to write the programs in.

To give an example of how the scroller can be used I have included a demonstration, making it into a mini-game.

The keys to control your spacecraft are X and Y for left/right, : and / for up/down. All you have to do is avoid crashing into the walls.

If you find the game too difficult you can set the cheat location to TRUE right at the beginning of the program. Happy scrolling!

```
10 REM Software Scroller
20 REM by Paul Bedworth
30 REM (c) The Micro User
40 REM Save this program be
fore
50 REM running it.
60 cheat=&84
70 ?cheat=&FFFE
80 *TV 255
90 MapDepth=6
100 MapWidth=7
110 MapTopGap=1
120 MapLeftGap=1
130 SprWidth=4
140 SprDepth=32
150 IncNr=&140*SprWidth
160 IncNc=&8*SprWidth
170 osbyte=&FFFF
180 oswrch=&FFFE
190 :
200 AL1=MapTopGap*IncNr
210 AL2=MapLeftGap*IncNc
220 ALIGN=AL1+AL2
230 :
240 REM screen start address
es
250 REM - screen 1 must be l
over
260 REM than screen 2 -
270 screen1=&3000
280 screen2=&5800
290 :
300 REM zero page pointers
310 addr=&80
320 topaddr=&82
330 data=&76
340 :
350 FOR P=0 TO 2 STEP 2
360 PX=&1100
370 COPT P
380 JMP scroll
390 .xydata
400 OPT FNxydata
410 .calc LDY y:LDA xydata,Y
420 STA a:LDA xydata+32,Y
430 STA a+1
440 LDA x:BER endit:TAY
450 .cl LDA x:CLC #8:STA
```

Scrolling landscape

Paul Bedworth explains how to create some really amazing games



UTILITY

```

>
a
460 LDA a+1:ADC #0:STA a+1:
DEY:BNE cl
470 .endit
480 LDA sn:CMF #2:BNE endit
2
490 LDA a:SEC:SBC #2800 MO
D 256
500 STA a
510 LDA a+1:SBC #2800 DIV
256
520 STA a+1
530 .endit2
540 RTS
550 .demo
560 LDA cheat
570 BNE cheaton
580 LDA deathflag
590 BNE dead
600 .cheaton
610 LDX #89E:JSR key
620 BNE notleft
630 LDA x:CMF #5:BCC notlef
t
640 DEC x
650 .notleft
660 LDX #8BD:JSR key
670 BNE notright
680 LDA x:CMF #24:BCS notri
ght
690 INC x
700 .notright
710 LDX #897:JSR key
720 BNE notdown
730 LDA y:CMF #25:BCS notdo
wn
740 INC y
750 .notdown
760 LDX #8B7:JSR key
770 BNE notup
780 LDA y:CMF #5:BCC notup
790 DEC y
800 .notup
810 LDA #ASC("P")
820 JSR schoose
830 JSR calc
840 LDA #4:STA cols
850 JSR plot
860 RTS
870 .dead
880 LDA deathflag:CMF #1:BN
E novdus
890 LDX #255
900 .vl
910 LDX #2
920 .v19l
930 LDA #19:JSR oswrch
940 LDA #0:JSR oswrch
950 TXA:JSR oswrch
960 LDA #0:JSR oswrch
970 JSR oswrch:JSR oswrch
980 DEX
990 BNE v19l
1000 DEY:BNE vl
1010 .novdus
1020 INC deathflag
1030 JSR wait
1040 RTS
1050 .key
1060 LDA #129
1070 LDX #255
1080 JSR osbyte
1090 CPY #255
1100 RTS
1110 .welldone
1120 JSR wait
1130 LDX #0
1140 .msg
1150 LDA text,X
1160 JSR oswrch
1170 INX
1180 CMF #0
1190 BNE msg
1200 LDA #21
1210 LDX #0
1220 JSR osbyte
1230 RTS
1240 .wait
1250 LDX #255
1260 .w1 LDX #255
1270 .w2 NOP:NOP:NOP:NOP:
NOP
1280 DEY
1290 BNE w2
1300 DEX
1310 BNE w1
1320 RTS
1330 .text
1340 OPT FNequb(22)
1350 OPT FNequb(5)
1360 OPT FNequb(31)
1370 OPT FNequb(2)
1380 OPT FNequb(4)
1390 OPT FNequs("Well Done!")
)
1400 OPT FNequb(31)
1410 OPT FNequb(2)
1420 OPT FNequb(6)
1430 OPT FNequs("Level 1 Com
pleted!")
1440 BRK
1450 .plot LDA addr:PHA:LDA a
ddr+1:PHA
1460 LDA a:STA addr:LDA a+1:
STA addr+1
1470 JSR eorsplot
1480 PLA:STA addr+1:PLA STA
addr
1490 RTS
1500 .splot \ plot spri
te
1510 LDA addr
1520 PHA
1530 STA tcaddr
1540 LDA addr+1
1550 PHA
1560 STA tcaddr+1
1570 .l1
1580 LDX #0
1590 LDX #4
1600 .l2
1610 LDA (data),Y \ This is
not
1620 STA (addr),Y \ bad prog
ramming!
1630 INY \ Makes it
faster
1640 LDA (data),Y
1650 STA (addr),Y
1660 INY
1670 LDA (data),Y
1680 STA (addr),Y
1690 INY
1700 LDA (data),Y
1710 STA (addr),Y
1720 INY
1730 LDA (data),Y
1740 STA (addr),Y
1750 INY
1760 LDA (data),Y
1770 STA (addr),Y
1780 INY
1790 LDA (data),Y
1800 STA (addr),Y
1810 INY
1820 LDA (data),Y
1830 STA (addr),Y
1840 INY
1850 LDA addr
1860 CLC
1870 ADC #838
1880 STA addr
1890 LDA addr+1
1900 ADC #1
1910 STA addr+1
1920 DEX
1930 BNE l2
1940 LDA data
1950 CLC
1960 ADC #SprDepth
1970 STA data
1980 LDA data+1
1990 ADC #0
2000 STA data+1
2010 LDA tcaddr
2020 ADC #8
2030 STA addr
2040 STA tcaddr
2050 LDA tcaddr+1
2060 ADC #0
2070 STA tcaddr+1
2080 STA addr+1
2090 DEC cols
2100 BNE l1
2110 PLA
2120 STA addr+1
2130 PLA
2140 STA addr
2150 RTS
2160 .splot2 \ to enab
le
2170 LDA #SprWidth \ reverse
2180 SEC \ sprite-
clipping
2190 SBC cols
2200 TAY
2210 BEQ dosplot
2220 .s2l
2230 LDA data
2240 CLC
2250 ADC #SprDepth
2260 STA data
2270 LDA data+1
2280 ADC #0
2290 STA data+1
2300 DEY
2310 BNE s2l
2320 .dosplot
2330 JMP splot
2340 .eorsplot
2350 LDA addr
2360 PHA
2370 STA tcaddr
2380 LDA addr+1
2390 PHA
2400 STA tcaddr+1
2410 .el1
2420 LDX #0
2430 LDX #4:STX cd
2440 .eel2 LDX #8
2450 .el2
2460 LDA (data),Y:BEQ black
2470 PHA:LDA (addr),Y:BEQ no
hit
2480 LDA #1:STA deathflag
2490 .nohit
2500 PLA
2510 .black
2520 EOR (addr),Y:STA (addr)
,Y:INX
2530 DEX:BNE el2
2540 LDA addr:CLC:ADC #838:S
TA addr
2550 LDA addr+1:ADC #1:STA a
ddr+1
2560 DEC cd
2570 BNE eel2
2580 LDA data
2590 CLC:ADC #SprDepth:STA d
ata
2600 LDA data+1:ADC #0:STA d
ata+1
2610 LDA tcaddr:ADC #8:STA a
ddr
2620 STA tcaddr
2630 LDA tcaddr+1:ADC #0:STA
tcaddr+1
2640 STA addr+1
2650 DEC cols
2660 BNE el1
2670 PLA:STA addr+1
2680 PLA:STA addr
2690 RTS
2700 .switch1 \ change scr
een
2710 LDA #19 \ start addr
ess
2720 JSR osbyte \ to screen
1
2730 LDA #13
2740 STA #FE00
2750 LDA #screen1 MOD 2048
DIV 8)
2760 STA #FE01
2770 LDA #12
2780 STA #FE00
2790 LDA #screen1 DIV 2048)
2800 STA #FE01
2810 LDA #1:STA sn
2820 RTS
2830 .switch2
2840 LDA #19 \ change scr
een
2850 JSR osbyte \ start addr
ess
2860 LDA #13 \ to screen
2
2870 STA #FE00
2880 LDA #screen2 MOD 2048
DIV 8)
2890 STA #FE01
2900 LDA #12

```





```

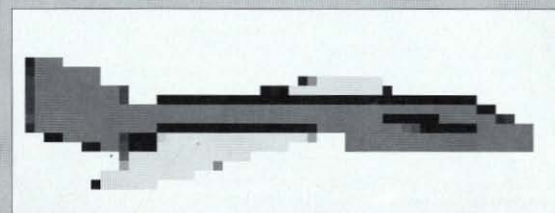
2910 STA &FE00
2920 LDA #screen2 DIV 2048)
2930 STA &FE01
2940 LDA #2:STA sn
2950 RTS
2960 .scroll
2970 LDA #22
2980 JSR oswrch
2990 LDA #5
3000 JSR oswrch
3010 LDA #23:JSR oswrch
3020 LDA #0:JSR oswrch
3030 LDA #10:JSR oswrch
3040 LDA #32:JSR oswrch
3050 LDA #0:JSR oswrch:JSR o
swrch
3060 JSR oswrch:JSR oswrch
3070 JSR oswrch:JSR oswrch
3080 LDA #0 \ clear break f
lag
3090 STA &FF
3100 STA deathflag
3110 LDY #0
3120 LDA #83000 MOD 256
3130 STA &90
3140 LDA #83000 DIV 256
3150 STA &91
3160 .bloop
3170 LDA #0
3180 STA (&90),Y \ clear bot
h
3190 LDA &90 \ of the sc
reens
3200 CLC \ -NB- this
will
3210 ADC #1 \ clear fro
m the
3220 STA &90 \ start of
screen1
3230 BCC nc \ all the w
ay to
3240 INC &91 \ &7FFF
3250 .nc
3260 LDA &90
3270 CMP #88000 MOD 256
3280 BNE bloop
3290 LDA &91
3300 CMP #88000 DIV 256
3310 BNE bloop
3320 LDA #map MOD 256 \ init
ialise
3330 STA &70 \ poin
ters to
3340 LDA #map DIV 256 \ map
data
3350 STA &71
3360 .scroll \ control
loop
3370 JSR demo
3380 JSR switch1 \ switch t
o screen 1
3390 CMP #8EA
3400 LDA #screen2 MOD 256
3410 CLC
3420 ADC #ALIGN MOD 256
3430 STA maptop
3440 LDA #screen2 DIV 256
3450 ADC #ALIGN DIV 256
3460 STA maptop+1
3470 JSR plotmap \ plot map
over scr 2
3480 CMP #8EA
3490 BNE cont1
3500 JSR welldone
3510 RTS
3520 .cont1
3530 JSR demo

```

```

3540 JSR switch2 \ reveal ma
p on scr 2
3550 LDA #screen1 MOD 256
3560 CLC
3570 ADC #ALIGN MOD 256
3580 STA maptop
3590 LDA #screen1 DIV 256
3600 ADC #ALIGN DIV 256
3610 STA maptop+1
3620 JSR plotmap \ plot map
over scr 1
3630 CMP #8EA
3640 BNE cont2
3650 JSR welldone
3660 RTS
3670 .cont2
3680 LDA deathflag
3690 CMP #2
3700 BCC notdeadyet
3710 JMP scroll
3720 .notdeadyet
3730 BIT &FF \ test for
break
3740 BEQ scriploop
3750 BRK
3760 OPT FNequs(27)
3770 OPT FNequs("Escape")
3780 BRK
3790 .plotmap \ plot a s
creen
3800 INC counter \ from the
map data
3810 LDA &70
3820 STA old70
3830 LDA &71
3840 STA old70+1
3850 LDY #0
3860 STY mcol
3870 LDA maptop
3880 STA addr
3890 LDA maptop+1
3900 STA addr+1
3910 .ml
3920 LDY #0
3930 LDA addr
3940 STA topaddr
3950 LDA addr+1
3960 STA topaddr+1
3970 .pml
3980 LDA (&70),Y \ load ma
p symbol
3990 CMP #8EA
4000 BNE noteod
4010 RTS
4020 .noteod
4030 JSR schoose \ and cho
ose the
4040 LDA mcol \ corresp
onding
4050 BEQ doclip \ sprite
4060 LDA #SprWidth
4070 STA cols
4080 JMP overdoclip
4090 .doclip
4100 LDA ncols \ only pr
int
4110 STA cols \ 'ncols'
columns
4120 .overdoclip \ of the
sprite
4130 STY ystore
4140 LDA mcol \ if no
t last
4150 CMP #MapWidth-1 \ colum
n then do
4160 BNE dosplot2 \ a rev
erse clip

```



```

4170 LDA #SprWidth
4180 SEC
4190 SBC ncols
4200 BNE goon
4210 LDA #SprWidth
4220 .goon STA cols
4230 JSR splot \ do the
clip the
4240 JMP oversplot2 \ other
way around
4250 .dosplot2
4260 JSR splot2
4270 .oversplot2
4280 LDY ystore \ go on
to next
4290 LDA addr \ map ro
w
4300 CLC
4310 ADC #IncNr MOD 256
4320 STA addr
4330 LDA addr+1
4340 ADC #IncNr DIV 256
4350 STA addr+1
4360 INY
4370 CPY #MapDepth
4380 BNE pml
4390 LDA mcol
4400 BNE ok
4410 LDA #4
4420 SEC
4430 SBC ncols
4440 BEQ ndec
4450 TAY
4460 .decl
4470 LDA topaddr
4480 SEC
4490 SBC #8
4500 STA topaddr
4510 LDA topaddr+1
4520 SBC #0
4530 STA topaddr+1
4540 DEY
4550 BNE decl
4560 .ndec
4570 DEC ncols
4580 BNE ok
4590 LDA #SprWidth
4600 STA ncols
4610 .ok
4620 INC mcol
4630 LDA &70
4640 CLC
4650 ADC #MapDepth
4660 STA &70
4670 LDA &71
4680 ADC #0
4690 STA &71
4700 LDA topaddr \ g
o on to
4710 CLC \ n
ext map
4720 ADC #IncNr MOD 256 \ c
olumn
4730 STA addr
4740 LDA topaddr+1
4750 ADC #IncNr DIV 256
4760 STA addr+1
4770 LDA mcol
4780 CMP #MapWidth
4790 BEQ nml
4800 JMP ml
4810 .nml
4820 LDA counter \ decide
whether
4830 CMP #4 \ to go
onto next
4840 BNE notc4 \ column
of data
4850 LDA old70 \ or to
keep
4860 CLC \ scroll
ing
4870 ADC #MapDepth \ curren
t data
4880 STA &70
4890 LDA old70+1
4900 ADC #0
4910 STA &71
4920 LDA #0
4930 STA counter
4940 JMP overnotc4
4950 .notc4
4960 LDA old70
4970 STA &70
4980 LDA old70+1
4990 STA &71
5000 .overnotc4
5010 RTS
5020 :
5030 .schoose
5040 STA symbol
5050 STY ystore
5060 LDY #0
5070 .searchl
5080 LDA sptable,Y
5090 BEQ notfound
5100 CMP symbol
5110 BEQ foundit
5120 INY:INY
5130 INY
5140 JMP searchl
5150 .foundit
5160 LDA sptable+f,Y
5170 STA data
5180 LDA sptable+2,Y
5190 STA data+1
5200 LDY ystore
5210 RTS
5220 .notfound
5230 LDA sptable+1
5240 STA data
5250 LDA sptable+2
5260 STA data+1
5270 LDY ystore
5280 RTS
5290 .cols BRK
5300 .tcaddr BRK:BRK
5310 .maptop BRK:BRK

```




```
*4)
5320 .ncols OPT FNequb(Sp
rWidth)
5330 .ystore BRK
5340 .mcol BRK
5350 .counter BRK
5360 .old70 BRK:BRK
5370 .symbol BRK
5380 .sn OPT FNequb(1)
5390 .cd BRK
5400 .deathflag BRK
5410 .x OPT FNequb(10)
5420 .y OPT FNequb(10)
5430 .a BRK:BRK
5440 .map
5450 OPT FNequb("O ")
5460 OPT FNequb("O ")
5470 OPT FNequb("O ")
5480 OPT FNequb("O ")
5490 OPT FNequb("O ")
5500 OPT FNequb("O ")
5510 OPT FNequb("0000 O")
5520 OPT FNequb("0000 O")
5530 OPT FNequb("0000 O")
5540 OPT FNequb("0000 O")
5550 OPT FNequb("0000 O")
5560 OPT FNequb("0000 O")
5570 OPT FNequb("000 O")
5580 OPT FNequb("O ")
5590 OPT FNequb("O 000")
5600 OPT FNequb("O O ")
5610 OPT FNequb("O 0000")
5620 OPT FNequb("O ")
5630 OPT FNequb("O ")
5640 OPT FNequb("0000 O")
5650 OPT FNequb("0000 O")
5660 OPT FNequb("00 O")
5670 OPT FNequb("00 00")
5680 OPT FNequb("O 000")
5690 OPT FNequb("O 000")
5700 OPT FNequb("00 00")
5710 OPT FNequb("00 O")
5720 OPT FNequb("0000 O")
5730 OPT FNequb("0000 O")
5740 OPT FNequb("O ")
5750 OPT FNequb("O 00 O")
5760 OPT FNequb("O 00 O")
5770 OPT FNequb("O 00 O")
5780 OPT FNequb("O 00 O")
5790 OPT FNequb("O 00 O")
5800 OPT FNequb(" O ")
5810 OPT FNequb(" O ")
5820 OPT FNequb(" 0000 ")
5830 OPT FNequb(" ")
5840 OPT FNequb("00 00")
5850 OPT FNequb("00 00")
5860 OPT FNequb(" ")
5870 OPT FNequb(" ")
5880 OPT FNequb(" ")
5890 NOP
5900 .sptable
5910 OPT FNequb(" ")
5920 OPT FNequb(blankdata)
5930 OPT FNequb("P")
5940 OPT FNequb(blankdata)
5950 OPT FNequb("O")
5960 OPT FNequb(blankdata+32

6000 .blankdata
6010 OPT FNequb(STRINGS(4*32
,CHRS(0)))
6020 J:NEXT
6030 PROCexecute
6040 END
6050 :
6060 DEFFNsdata
6070 RESTORE
6080 FOR IX=1 TO ((SprWidth*S
prDepth)/4)*2
6090 READ dS
6100 [OPT P:OPT FNequb(EVAL("
&"&dS))]
6110 J:NEXT:=P
6120 :
6130 DEFFNxdata
6140 RESTORE 6240
6150 FOR IX=1 TO 64/4
6160 READ dS
6170 [OPT P:OPT FNequb(EVAL("
&"&dS))]:J
6180 NEXT:=P
6190 :
6200 DATA 0,E0C0C08,F0F0F0E,1
0E0F0F0,80,0,0,0,0,F0F0D,C
0E0F0F0,80,0,0,0,E0600000,70
E0F0D,383,0,0,0,0,0,3060C0D,
F0F,0,0,0,0
6210 DATA 3C7F7FFF,2C3C1C2C,1
C2C3C1C,3C1C2C3C,2C3C1C2C,1C2C
3C1C,3C1C2C3C,F0F0F2C,60FFFFF
F,0D060B0D,80D060B0,60B0D060,D0
60B0D0,80D060B0,60B0D060,F0F0F
D0,D0FFFFF,80D060B0,60B0D060,
D060B0D0,80D060B0,60B0D060,D06
0B0D0,F0F0F80,B3FFFFF
6220 DATA73B3F373,F373B3F3,B3
F373B3,73B3F373,F373B3F3,B3F37
3B3,1F1F3F73
6230 :
6240 DATA C0804000,C0804000,C
0804000,C0804000,C0804000,C080
4000,C0804000,C0804000,5B5A595
B,605F5E5D,65646362,6A696867,6
F6E606C,74737271,79787776,7E7D
7C7B
6250 :
6260 DEFFNequb(sS)$P%$=S:P%$=P
X%Lens$:=P
6270 DEFFNequb(BX)?PX=B%$P%$=P
X+1:=P
6280 DEFFNequb(WX)?PX=W%$P%$=P
X+2:=P
6290 DEFFNequb(DX)?PX=D%$P%$=P
X+4:=P
6300 :
6310 DEFFPROCexecute
6320 sS="CALL scroll"&CHRS(13
)
6330 FOR L=1 TO LEN(sS)
6340 X=0:Y=ASCWIDS(sS,L)
6350 AX=138:CALL asbyte
6360 NEXT:ENDPROC
```

```
10 = 0 0
20 = 0 0
30 = 0 0
40 = 0 0
50 = 0 0
60 = D964 4
70 = 4189 9
80 = 3327 9
90 = D88C 2
100 = A2EB 3
110 = 8C03 0
120 = 888A 2
130 = 891 8
140 = 2401 8
150 = 967F 3
160 = A4F3 1
170 = 7966 1
180 = 78 C
190 = 9719 3
200 = A1B5 2
210 = 29F6 B
220 = 4706 3
230 = 9719 F
240 = 0 F
250 = 0 F
260 = 0 F
270 = 1294 F
280 = 442E E
290 = 9719 9
300 = 0 9
310 = 2360 2
320 = 5F87 6
330 = 9280 7
340 = 9719 3
350 = 71C1 8
360 = E3C5 5
370 = 6C81 6
380 = C5F8 5
390 = 2638 5
400 = BC45 2
410 = 9E7C 3
420 = 22E6 D
430 = 9862 5
440 = 90C 9
450 = 70F1 B
460 = 68A2 F
470 = BC42 1
480 = 8303 0
490 = 6685 6
500 = 1406 2
510 = 9DBE 1
520 = 9862 4
530 = D246 E
540 = 984F 3
550 = C49B 9
560 = 1E7D 4
570 = 426E 0
580 = 6742 5
590 = 4036 B
600 = 5BE2 6
610 = 46CC 0
620 = 8A18 0
630 = 5691 3
640 = F733 C
650 = 9394 9
660 = 89EA C
670 = E33F C
680 = B95A C
690 = C85E 2
700 = EC27 4
710 = 2B70 5
720 = 4B23 D
730 = 31B0 7
740 = D877 F
750 = 52AF 0
760 = F75 C
770 = B687 C
780 = 388A C
790 = E712 F
800 = 6310 F
810 = 4C8E 8
820 = 2D06 6
830 = D40E 9
840 = 82E0 D
850 = 2FA1 6
860 = 9843 A
870 = 309D 8
880 = 8979 D
890 = 504E 3
900 = 9212 D
910 = CA07 9
920 = 4242 3
930 = 3863 A
940 = 703F B
950 = E688 1
960 = 703F B
970 = 8742 E
980 = E8A9 1
990 = 32E9 D
1000 = ABCE 0
1010 = 64FF 6
1020 = 9A7D E
1030 = 967B 9
1040 = 9843 9
1050 = E5EF C
1060 = 46C3 A
1070 = 504E 6
1080 = 8E7E A
1090 = 7F31 6
1100 = 9843 7
1110 = 9F71 6
1120 = 967B F
1130 = EA45 7
1140 = D65 6
1150 = AB19 0
1160 = 9224 1
1170 = 7602 4
1180 = 2F9 B
1190 = CABD C
1200 = F552 B
1210 = EA45 5
1220 = 8E7E B
1230 = 9843 6
1240 = F7BE 3
1250 = 15EE 8
1260 = 9975 9
1270 = 1BA0 D
1280 = F888 C
1290 = EC50 A
1300 = E8A9 0
1310 = DC33 E
1320 = 9843 E
1330 = 80E0 B
1340 = E1A1 0
1350 = 9A2C B
1360 = 83C2 5
1370 = 3B8 9
1380 = A91D 4
1390 = 8448 5
1400 = 83C2 B
1410 = 3B8 7
1420 = CF7F 9
1430 = 2A3B 1
1440 = E2B7 F
1450 = 7FC3 8
1460 = 83C4 A
1470 = 7EEF F
1480 = 3077 F
1490 = 9843 E
1500 = 20B8 2
1510 = 2DBF 1
1520 = 824E 1
1530 = 5DB8 D
1540 = DAEO E
1550 = 824E 6
1560 = 923D A
1570 = F5F2 5
1580 = 9CF1 3
1590 = AAC1 5
1600 = C591 9
1610 = 71E4 6
1620 = 5047 8
1630 = 97CF 2
1640 = 423D A
1650 = 8D34 E
1660 = 6623 5
1670 = 423D B
1680 = 8D34 8
1690 = 6623 C
1700 = 423D A
1710 = 8D34 6
1720 = 6623 8
1730 = 423D 9
1740 = 8D34 8
1750 = 6623 F
1760 = 423D 0
1770 = 8D34 E
1780 = 6623 1
1790 = 423D E
1800 = 8D34 1
1810 = 6623 0
1820 = 423D 3
1830 = 8D34 C
1840 = 6623 8
1850 = 20BF 3
1860 = 74FB A
1870 = 7E04 E
1880 = FEB2 5
1890 = DAEO B
1900 = B19F 0
1910 = 4B39 7
1920 = E8A9 1
1930 = 33D9 7
1940 = 5B2B 9
1950 = 74FB 1
1960 = 85D3 1
1970 = 8826 3
1980 = BB22 9
1990 = A1BE B
2000 = 2AFB 2
2010 = CC62 2
2020 = 20B6 B
2030 = FEB2 F
2040 = 5DB8 8
2050 = E3B3 1
2060 = A1BE 3
2070 = 923D 4
2080 = 4B39 9
2090 = 8455 7
2100 = 3BA B
2110 = 4E8A 4
2120 = 4B39 A
2130 = 4E8A E
2140 = FEB2 6
2150 = 9843 B
2160 = CBE0 8
2170 = D313 9
2180 = 20BF 9
2190 = 67BD 4
2200 = 772F 0
2210 = 5A8B 4
2220 = DA91 B
2230 = 5B2B E
2240 = 74FB C
2250 = 85D3 C
2260 = 8826 9
2270 = BB22 5
2280 = A1BE 9
2290 = 2AFB 5
2300 = F888 6
2310 = 104B B
2320 = 7792 C
2330 = B546 7
2340 = 9C8E E
2350 = 20BF 8
2360 = 824E 3
2370 = 5DB8 A
2380 = DAEO 7
2390 = 824E 6
2400 = 923D B
2410 = 8D8A A
2420 = 9CF1 2
2430 = 4137 A
2440 = 1104 C
2450 = BDD9 4
2460 = 18B5 C
2470 = CB8C F
2480 = 7A81 B
2490 = 5388 1
2500 = 4E8A 8
2510 = D1FB C
2520 = C1B6 4
2530 = 20B0 7
2540 = FB07 0
2550 = 63A5 6
2560 = 5F53 A
2570 = 7AED F
2580 = 5B2B A
2590 = 6242 2
2600 = 56AB 6
2610 = A27A A
2620 = 20BB 2
2630 = 92FD A
2640 = 4B39 3
2650 = 845D D
2660 = 4A63 6
2670 = D119 D
2680 = A57B 6
2690 = 9843 C
2700 = F7CC 0
2710 = 4C67 7
2720 = 2A24 2
2730 = 8043 C
2740 = FC40 3
2750 = C5F3 F
2760 = EC61 B
2770 = 9062 3
2780 = FC40 D
2790 = CFC D
2800 = EC61 0
2810 = 6C9A 9
2820 = 9843 E
2830 = 5B8A 2
2840 = 4C67 F
2850 = 2A24 E
2860 = AC9 F
2870 = FC40 2
2880 = A56 A
2890 = EC61 F
2900 = 9062 A
2910 = FC40 A
2920 = 21B8 5
2930 = EC61 C
2940 = A4EF 3
2950 = 9843 D
2960 = DB26 D
2970 = C531 1
2980 = 9224 C
2990 = 523D 0
3000 = 9224 C
3010 = E84 D
3020 = 7D3F 8
3030 = 20BF F
3040 = AC92 F
3050 = 466 3
3060 = 8742 5
3070 = 8742 6
3080 = 97FA 5
3090 = 7359 6
3100 = 87F4 C
3110 = 9CF1 8
3120 = DF80 3
```




3130 = 756F A	3460 = B062 6	3790 = E807 0	4120 = B2BF 3	4450 = 772F F	4780 = A7E9 1	5110 = 4017 4	5440 = AA2 5	5770 = 300B F
3140 = 9833 5	3470 = 8938 1	3800 = 9A80 8	4130 = A80C 0	4460 = D777 5	4790 = 4C05 2	5120 = 838C 4	5450 = 60B6 3	5780 = 300B 9
3150 = 654E F	3480 = 434B E	3810 = F176 5	4140 = A73 1	4470 = 9460 8	4800 = FFA1 0	5130 = 6623 F	5460 = 60B6 A	5790 = 300B 7
3160 = 2C0D 4	3490 = 788B 0	3820 = 320D F	4150 = 4477 C	4480 = 8000 9	4810 = C522 A	5140 = 747E E	5470 = 60B6 F	5800 = 4E0C A
3170 = 295 5	3500 = 7010 F	3830 = E157 A	4160 = B4E8 2	4490 = 7C77 F	4820 = 6E0D A	5150 = 600E 6	5480 = 60B6 E	5810 = 4E0C D
3180 = 7389 B	3510 = 9843 1	3840 = 54E4 D	4170 = 54E3 D	4500 = DEF5 6	4830 = 6304 1	5160 = 3E5B 3	5490 = 60B6 0	5820 = 6200 F
3190 = 590B C	3520 = A01C E	3850 = 9C11 E	4180 = 8D00 0	4510 = 954A 0	4840 = 3C4C 4	5170 = 882E B	5500 = 60B6 1	5830 = 5002 6
3200 = 80C4 3	3530 = A55E E	3860 = C03 1	4190 = CBED 4	4520 = F0FF B	4850 = EA31 5	5180 = 670B 6	5510 = 770 2	5840 = 209 7
3210 = 53CF A	3540 = E79D 7	3870 = 84F 5	4200 = 9E4E 9	4530 = 75FC 4	4860 = 802D E	5190 = 2AFB 6	5520 = 770 7	5850 = 209 B
3220 = 2855 7	3550 = 56E7 7	3880 = FEB2 0	4210 = 54ED E	4540 = F888 8	4870 = A7EE 2	5200 = 3905 6	5530 = 770 2	5860 = 5002 6
3230 = 552D A	3560 = 74FB E	3890 = CCEC 7	4220 = AA5D 0	4550 = A75C 1	4880 = 5660 8	5210 = 9843 1	5540 = 770 F	5870 = 5002 4
3240 = C60D 6	3570 = F609 6	3900 = 4B39 4	4230 = 66CD 7	4560 = D325 5	4890 = 1E7C D	5220 = D37E B	5550 = 770 D	5880 = 5002 2
3250 = E927 1	3580 = 9996 7	3910 = 409B D	4240 = 1849 0	4570 = EEAD 9	4900 = A1BE 0	5230 = 8FE4 D	5560 = 770 B	5890 = 41AB 3
3260 = D279 2	3590 = 1264 E	3920 = 9C11 1	4250 = 8A61 8	4580 = AD56 4	4910 = 4641 B	5240 = 882E 8	5570 = 32A D	5900 = C0AF 9
3270 = 6901 D	3600 = B25A F	3930 = 20BF 5	4260 = 84D 4	4590 = 54ED 3	4920 = 295 7	5250 = BF87 4	5580 = 2ED5 3	5910 = 4C3E 9
3280 = F95A F	3610 = B062 C	3940 = DEF5 2	4270 = D1BF F	4600 = 167C 3	4930 = 7721 2	5260 = 2AFB 8	5590 = 3128 1	5920 = 6721 5
3290 = C258 0	3620 = 8938 D	3950 = 0AE0 5	4280 = 836F D	4610 = 581E C	4940 = 1819 F	5270 = 3905 F	5600 = 7732 6	5930 = 9436 0
3300 = 2082 4	3630 = 434B 5	3960 = 75FC B	4290 = 7A15 A	4620 = F8AB A	4950 = C285 F	5280 = 9843 2	5610 = 2BAC D	5940 = 133A 7
3310 = F95A 5	3640 = 48E8 1	3970 = 9940 E	4300 = 74FB 6	4630 = C4CE E	4960 = C4CE E	5290 = 4C0A 4	5620 = 2ED5 7	5950 = F5D 1
3320 = 985E 6	3650 = 701D 7	3980 = 9C43 D	4310 = A95B B	4640 = 74FB 2	4970 = 5660 C	5300 = CF83 2	5630 = 2ED5 0	5960 = 382A 5
3330 = 48C9 C	3660 = 9843 5	3990 = 434B 3	4320 = FEB2 4	4650 = 222C E	4980 = 1E7C D	5310 = E280 A	5640 = 770 B	5970 = E2BF E
3340 = 1016 9	3670 = 9D7F 3	4000 = 3C11 6	4330 = DAE0 5	4660 = 566D 4	4990 = 4641 5	5320 = C731 B	5650 = 770 4	5980 = 78FE E
3350 = 4641 8	3680 = 6742 B	4010 = 9843 7	4340 = ED08 8	4670 = E157 9	5000 = 2300 4	5330 = AAB 2	5660 = 19AE D	5990 = 11CC 3
3360 = C87E E	3690 = 228B 9	4020 = 30C9 9	4350 = 4B39 C	4680 = A1BE 9	5010 = 9843 9	5340 = 644A D	5670 = 209 9	6000 = 435 2
3370 = A55E C	3700 = 5560 9	4030 = CA73 8	4360 = 6623 F	4690 = 4441 C	5020 = 9719 F	5350 = D05F 0	5680 = 3128 8	6010 = 1B5D F
3380 = 60FB 9	3710 = C5FB 3	4040 = 1B85 B	4370 = C56E 3	4700 = B7AD D	5030 = 68FC 0	5360 = EE3D D	5690 = 3128 F	6020 = 0A42 0
3390 = 434B 2	3720 = 96CD 3	4050 = 3FE3 A	4380 = 5A99 7	4710 = B7AD 0	5040 = 599 1	5370 = 6570 1	5700 = 209 5	6030 = 73AB 1
3400 = 8E65 9	3730 = F2DE E	4060 = 54ED 1	4390 = C818 1	4720 = D621 A	5050 = A80C 8	5380 = C556 1	5710 = 19AE 8	6040 = 6D2E 4
3410 = 74FB 1	3740 = 9847 F	4070 = 7AA3 2	4400 = A056 B	4730 = FEB2 3	5060 = 9C1F A	5390 = B2B2 2	5720 = 770 6	6050 = 9719 5
3420 = F609 E	3750 = E2BF B	4080 = 6CFA 8	4410 = 4211 5	4740 = 954A 5	5070 = 5481 D	5400 = 7A5C 5	5730 = 770 B	6060 = 380B E
3430 = 9996 2	3760 = 1E5A 1	4090 = 9AC3 2	4420 = 8D00 8	4750 = 62C2 D	5080 = FB0D 1	5410 = AA4 2	5740 = 2ED5 6	6070 = 9FFB F
3440 = CAE6 D	3770 = 38BE D	4100 = 14DE 5	4430 = CBED 2	4760 = 4B39 9	5090 = 3FB9 A	5420 = A458 C	5750 = 300B 5	6080 = E910 6
3450 = B25A 5	3780 = E2BF E	4110 = A998 8	4440 = F484 D	4770 = C818 A	5100 = 74AA F	5430 = 752E E	5760 = 300B 5	6090 = 215F 0

Get it right ✓

6100 = 8890 F
6110 = E2A3 0
6120 = 9719 2
6130 = 1E0E 4
6140 = A44D 2
6150 = E9FA 6
6160 = 215F 1
6170 = 708E A
6180 = 963A 8
6190 = 9719 D
6200 = B4A7 9
6210 = DF89 5
6220 = 3E21 B
6230 = 9719 1
6240 = 1E2A 8
6250 = 9719 0
6260 = E406 F
6270 = 9872 B
6280 = 517A 0
6290 = 915A 9
6300 = 9719 A
6310 = 9E0D C
6320 = E90F 9
6330 = F9D 3
6340 = F1F5 C
6350 = 75EE 0
6360 = E531 3

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88 MICRO USER July 1991

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WE looked last month at the Duffing oscillator, which is basically a two dimensional attractor. However, most strange attractors occupy multidimensional space, a good example being the Lorenz attractor.

Lorenz was one of the discoverers of strange attractors. Working in the early sixties on trying to model atmospheric movement, he would start out with some initial values representing the current weather and plug them into some formula and see what happened.

Computers in those days were quite slow and he would often halt a run and resume it later. However he noticed that some repeat runs developed very differently from others, despite having the same initial conditions.

What was in fact happening was that the initial conditions were not the same, as the computer was rounding its numbers before printing it out.

Lorenz had discovered that systems can be extremely sensitive to initial conditions. This was quite important because it proved that we could never precisely predict the weather, as we could never know the initial conditions accurately enough.

The attractor named after Lorenz was derived from a simplified form of the equations he was working on. It is a fractal curve occupying three dimensional space.

The remarkable feature is that although it occupies a finite space the curve is infinitely long and never crosses itself.

Many programs have been published to show a simple two dimensional projection of this curve, but never to allow it to be examined in three dimensions.

The program in Listing I will do this, drawing four views simultaneously - front elevation, end elevation, plan and isometric projection, thus giving as close to a three dimensional representation as you can get.

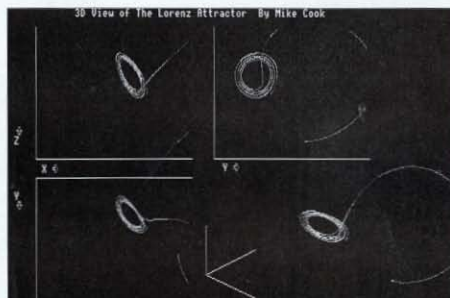
This form of representing three dimensional objects is well known to practitioners of engineering and technical drawing. The curve changes colour every 60 points. Not only is this colourful but it makes it easier to see the 3D structure.

While the curve is plotting you can use the function keys to change the scale and shift the curve. The instructions show you what keys to use but you might like to make a strip to go across the function keys.

Lines 190 to 210 define the increment to use in making a new 3D point from the old one. These in effect

define the attractor. The variable INC in line 110 is used to determine the distance on the attractor between plotted points. The default value is fine on the 32 bit machine, but on 8 bit ones should be changed to 8E-3, that's 0.008.

In order to convert the program to run on the Model B or Master, change the Mode to 0 in line 30 and delete lines 180, 510 and 880. On an Archimedes or BBC A3000 make sure you are in Mode 15 before you start.



The Lorenz attractor in 3D

3D Attractors

In the final part of this series Mike Cook examines a multi dimensional strange attractor

```

10 REM > <BasicSave$Dir>.Strange3D
20 REM 3D View of The Lorenz Attractor
r By Mike Cook
30 MODE 15
40 VDU23,137,&18,&14,&F2,&81,&F2,&14,
&18,&00 :REM Right arrow...
50 VDU23,138,&3C,&24,&24,&E7,&42,&24,
&18,&00 :REM Down arrow...
60 VDU23,139,&18,&24,&42,&E7,&24,&24,
&3C,&00 :REM Up arrow....
70 C1=0.707107:C2=0.408248
80 C3=0.816597:C4=-C2
90 S=8:ST=28
100 NX=70
110 INC=1E-3
120 SX=200:SY=200:SZ=0
130 CX=5:CY=5:CZ=5
140 P1=10:P2=28:P3=2.66666
150 PROC_INTRO
160 REPEAT
170 NX=NX+1
180 IF NX>60 THEN NX=0:GCOL 0,RND(63)
190 D1=P1*(Y-X)
200 D2=P2*X-Y*X*2
210 D3=X*Y-P3*Z
220 X=X+D1*INC
230 Y=Y+D2*INC
240 Z=Z+D3*INC

250 PROC_VPLOT(X,Y,Z)
260 IF INKEY(-114) THEN S=S+10/PROC_
AXIS
270 IF INKEY(-115) THEN S=S-10/PROC_
AXIS
280 IF INKEY(-116) THEN SX=SXX+50:PRO
C_AXIS
290 IF INKEY(-21) THEN SX=SXX-50:PROC_
AXIS
300 IF INKEY(-117) THEN SY=SYX+50:PRO
C_AXIS
310 IF INKEY(-118) THEN SY=SYX-50:PRO
C_AXIS
320 IF INKEY(-23) THEN SZ=SZX+50:PROC_
AXIS
330 IF INKEY(-119) THEN SZ=SZX-50:PROC_
C_AXIS
340 IF INKEY(-120) THEN X=CX:Y=CY:Z=CZ
:PROC_AXIS
350 IF INKEY(-86) THEN AS=GETS:PROC_IN
TRO:PROC_AXIS
360 UNTIL FALSE
370 END
380 :
390 DEF PROC_VPLOT(X,Y,Z)
400 X1=X*S:Y1=Y*S:Z1=Z*S
410 X2=X+SXX:Y2=Y+SYX:Z2=Z+SZX
420 IF X1<430 AND X2>0 AND Y1<430 AND
Y2>0 THEN PLOT 69,X1+88,440-Y1
440 IF Y1<430 AND Y2>0 AND Z1<430 AND
Z2>0 THEN PLOT 69,600+Y2,520+Z2
450 PROC_TRANS(X2,Z,Y,X,69)
460 ENDPROC
470 :
480 DEF PROC_INTRO
490 REPEAT
500 CLS
510 GCOL 0,63
520 PRINT TAB(12,0)"3D View of The Lor
enz Attractor By Mike Cook"
530 PRINTTAB(0,2)"F Key Effect"
540 PRINT 1 - Zoom in"
550 PRINT 2 - Zoom out"
560 PRINT 3 - Shift X right"
570 PRINT 4 - Shift X left"
580 PRINT 5 - Shift Y right"
590 PRINT 6 - Shift Y left"
600 PRINT 7 - Shift Z left"
610 PRINT 8 - Shift Z right"
620 PRINT 9 - Restart curve"
630 PRINT
640 PRINT"Increment is ";INC;" PRESS I

```




```

to alter"
650 PRINT
660 PRINT "Current Start Point PRESS S
to alter"
670 PRINT "Start X ";CX
680 PRINT "Start Y ";CY
690 PRINT "Start Z ";CZ
700 PRINT
710 PRINT "Parameters PRESS P to alter"
720 PRINT "P1 ";P1
730 PRINT "P2 ";P2
740 PRINT "P3 ";P3
750 PRINT
760 PRINT "SPACE BAR TO PLOT"
770 PRINT "N to return here for a
New plot"
780 AS=GET$
790 IF AS="P" OR AS="p" THEN INPUT "New
Parameters are:- "P1,P2,P3
800 IF AS="S" OR AS="s" THEN INPUT "New
Start Point is:- "CX,CY,CZ
810 IF AS="I" OR AS="i" THEN INPUT "New
Increment is:- "INC
820 UNTIL AS=" "
830 X=CX:Y=CY:Z=CZ
840 :

```

```

850 DEF PROC_AXIS
860 CLS
870 PRINT TAB(12,0)"3D View of The Lor
enz Attractor By Mike Cook"
880 GCOL 0,63
890 VDU5
900 MOVE 80,494
910 PRINT "X";SPC(1);CHR$(137)
920 MOVE 0,588
930 PRINT "Z"
940 MOVE 24,620
950 PRINTCHR$(139)
960 MOVE 0,400
970 PRINT "Y"
980 MOVE 24,368
990 PRINTCHR$(138)
1000 MOVE 600,498
1010 PRINT "Y";SPC(1);CHR$(137)
1020 VDU 4
1030 MOVE 80,512
1040 PLOT 1,0,16*SZ
1050 MOVE 80,512
1060 PLOT 1,16*SZ,0
1070 MOVE 592,512
1080 PLOT 1,16*SZ,0
1090 MOVE 592,512
1100 PLOT 1,0,16*SZ

```

```

1110 MOVE 80,0
1120 PLOT 1,0,16*SZ
1130 PLOT 1,16*SZ,0
1140 PROC_TRANS(0,100,-100,69)
1150 PROC_TRANS(200,100,-100,5)
1160 PROC_TRANS(0,100,-100,69)
1170 PROC_TRANS(0,300,-100,5)
1180 PROC_TRANS(0,100,-100,69)
1190 PROC_TRANS(0,100,100,5)
1200 REPEAT
1210 A=INKEY$(50)
1220 UNTIL A=-1
1230 ENDPROC
1240 :
1250 DEF PROC_TRANS(X,Y,Z,D%)
1260 LOCAL X,Y,Z
1270 YZ=(C2*X+C3*Y+C4*Z)
1280 XZ=(C1*X+C2*Y+C3*Z)+640
1290 IF XZ>530 AND YZ<512 THEN PLOT DX,
XZ,YZ
1300 ENDPROC

```

430 = 1A60 B
440 = FB17 5
450 = AB18 7
460 = ED0F 1
470 = 9719 6
480 = 4A08 7
490 = BFBA 8
500 = 7A16 0
510 = 7820 9
520 = 7ECA 5
530 = 85F6 B
540 = 7729 3
550 = 9EE1 B
560 = FFFE 6
570 = 2010 7
580 = 5C20 4
590 = 2E20 B
600 = 4081 9
610 = 9266 E
620 = C558 B
630 = FF3E 7
640 = 408E 5
650 = FF3E C
660 = 1480 A
670 = 7F67 3
680 = 2AE6 7
690 = D465 A
700 = FF3E 3
710 = EB60 E
720 = 4434 9
730 = BA87 9
740 = EF36 E
750 = FF3E B



760 = 2CC2 1
770 = 9280 7
780 = 77F2 F
790 = 4680 5
800 = B299 C
810 = 1268 A
820 = 2412 8
830 = B497 D
840 = 9719 F
850 = 56C5 8
860 = 7A16 3
870 = 7ECA 4
880 = 7820 5
890 = 667A 4
900 = 8998 3
910 = 3890 A
920 = 1E20 B
930 = 2CB3 2
940 = 7481 3
950 = E461 E
960 = 2181 8
970 = 79E0 0
980 = 0280 B
990 = 0750 A
1000 = 3B6A 1
1010 = 43F1 6
1020 = FC31 1
1030 = 57C4 8
1040 = D4AE A
1050 = 57C4 0
1060 = B559 5
1070 = F05A 8
1080 = B559 F
1090 = F05A 3
1100 = D4AE 0
1110 = 9138 2
1120 = D4AE E
1130 = B559 B
1140 = B67A F
1150 = 55AA 0
1160 = B67A 8
1170 = F7F8 5
1180 = B67A 8
1190 = E780 7
1200 = BFBA 4
1210 = CFAS 6
1220 = 1E3F A
1230 = ED0F 1
1240 = 9719 F
1250 = F71A 3
1260 = 71F6 5
1270 = 69D1 E
1280 = B207 2
1290 = E869 8

10 = 0 0	70 = 6E0A 3	130 = EE02 9	190 = 9EE0 1	250 = 18ED B	310 = D664 D	370 = F02E F
20 = 0 0	80 = B214 8	140 = 3E65 5	200 = BE57 E	260 = 2718 2	320 = 9960 F	380 = 9719 E
30 = 4C61 1	90 = 71C6 4	150 = DCC6 A	210 = 115 1	270 = 1996 C	330 = 566E A	390 = 1809 3
40 = 9726 D	100 = 786E 5	160 = BFBA 8	220 = B622 6	280 = 2C08 8	340 = 6AB2 6	400 = 1A3F 1
50 = B819 B	110 = 1353 2	170 = E967 1	230 = 7066 3	290 = 77EC D	350 = 8A10 F	410 = 7400 2
60 = 4EF6 4	120 = 5E0C 0	180 = E512 C	240 = A38D D	300 = EA51 4	360 = 226C D	420 = F24 3

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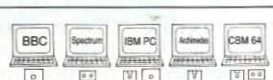
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ArcLight is a multi-tasking ray-tracer which will generate a realistic Euclid picture, or a complete Mogul film, while you are free to get on with other work.



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Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Such is the enthusiasm for **Euclid** there is a user group called **Elements**, now in its second year, which provides a quarterly disk containing hints, tips, animations and user pictures.

ArcLight £50
Euclid £70
Mogul £20
Splice £30
Tween £30
(inc.VAT)



Ace Computing
27 Victoria Road,
Cambridge,
CB4 3BW.

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PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

The Pineapple Software Real Time Colour Video Digitiser is now supplied with not just one, but two fully multitasking application programs! In fact the software supplied with each Digitiser comprises at least four different programs, (the number is increasing all the time). Included in these is the IMICCI application which is probably the most user friendly of all video processing programs. (See photo).

HARDWARE

The Digitiser hardware consists of a double width podule which plugs straight into the back of a 300 or 400 series Archimedes. (Note that a podule backplane is required in 300 series computers).

For A3000 owners we supply a special inexpensive adapter box which contains the digitiser card and plugs into the back of the A3000 using a ribbon cable.

Inputs are provided for PAL composite video and also R.G.B. Manual adjustment of Contrast, Saturation and Brightness provide for ease of initial setting up.

SOFTWARE

The Heart of the Digitiser software is a relocatable module which contains all the video processing routines. All of the previously mentioned software applications access these routines in various ways. For the user who can write simple BASIC programs this module provides easy access to all of the Digitiser routines via " commands and SWI's

The new multitasking software makes life very easy for those who wish to incorporate images into Wordprocessing, Desktop publishing, or Art packages. The ease with which grabbed images can be 'zoomed in' and 'cropped' to the required size has to be seen to be believed, and when the required part of the image is selected, it is then a simple matter to 'drag' the image directly into another application.

As well as providing it's own powerful processing routines the Pineapple Digitiser can just as easily use software such as ChangeFSI or AIM to process it's images giving unrivalled versatility.

Also now available in the Multitasking software is a routine to allow capture of a sequence of frames. The number which can be stored depends on the amount of memory you have available (and the size of image chosen), and when grabbed the images can be stored to disc or transferred to PAINT for analysis.

EXCLUSIVE FEATURES

The Pineapple Software Real Time Colour Digitiser is the only one currently liable with the following exclusive features:-

1. 16 bit operation (extended version) for smoother colour graduations.
2. Two independent multitasking applications plus other powerful software.
3. Digitising of the full video area normally displayed on a TV screen.
4. R.G.B inputs providing higher quality pictures from professional video equipment.

SPECIFICATION

Video Inputs	PAL coded video, 75 volts - 2.5 volts pk to pk. R.G.B. & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue - 192k Ram Extended version 5 bits Red, 6 bits Green, 5 bits Blue - 256k Ram
Picture Area	The Digitiser hardware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.

PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder video unit. This unit produces a full colour coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:-

1. External to computer - no podule slots required.
2. Complete sync pulse regeneration to provide the best possible signal for recording onto VHS recorders or displaying on TV monitors.
3. Switch selectable to 624 or 625 line operation - for interlaced or non-interlaced screen modes.
4. Plugs into R.G.B. computer socket and provides buffered output to feed Archimedes monitor, + coded signal output.
5. Adaptable for use with other computers or R.G.B. and Sync signal sources.

S/VHS Version £79.00

Price £69.00 + VAT p&p free

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NEW LOW PRICES!!!

BBC PCB Designer

NEW LOW PRICES!!!
NEW LOW PRICES!!!

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input routine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

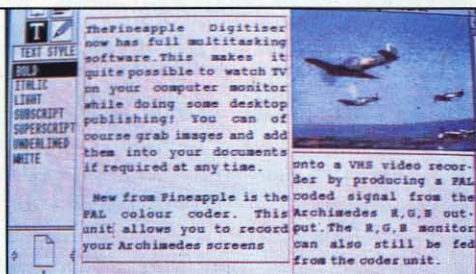
The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price. Acorn User - Aug 88

PRICE	EManual track routing	£55.00
	Auto track routing	£85.00
	Plotter Driver	£35.00

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IDigi Multitasking Application



IMICCI Application



Butterfly collection

- 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' -
- 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' -

Acorn User - April 90

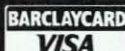
Digitiser Prices

Standard	£285.00
Extended	£315.00
A3000 Adaptor Box	£65.00

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RB2/115	Archimedes£45.00	Postage & Packing on Tracker Balls	
RB2/110	Nimbus£45.00		£ 1.75



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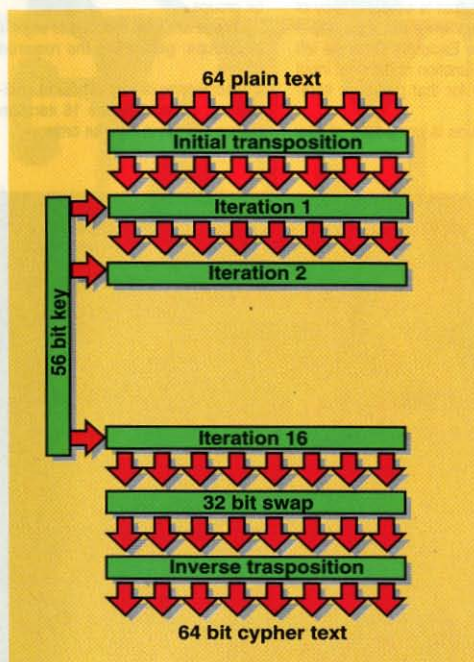


Figure 1:
The stages
of the
algorithm

A PART from the practical value of making vital information secure, there's a certain fascination in taking legible information, converting it to gobbledygook, then restoring it to its former state.

The United States Government has published an official standard for storing what they refer to as unclassified information: The Data Encryption Standard. The techniques used are fairly complex, but the resulting encrypted codes are virtual uncrackable. Except, presumably, by government cryptographers.

Listing 1 - InitDES - is used to compile the encryption routine and writes it to a file on disc as DES_mc).

This machine code file is loaded in at &1900 and PAGE should therefore be adjusted to at least &2300 before any programs are run.

Listing II - DES - is the file encryption program proper. Upon execution it resets PAGE to &2300 and loads DES_mc at &1900. It then asks for a filename, key and whether encryption or decryption is required. After this information has been entered the program processes the specified file.

So if you're happy not to know how it does what it does, just type in each listing in turn, using the checksums to ensure you've made no typing errors, and be careful to save them before running.

Apart from the standard checksum

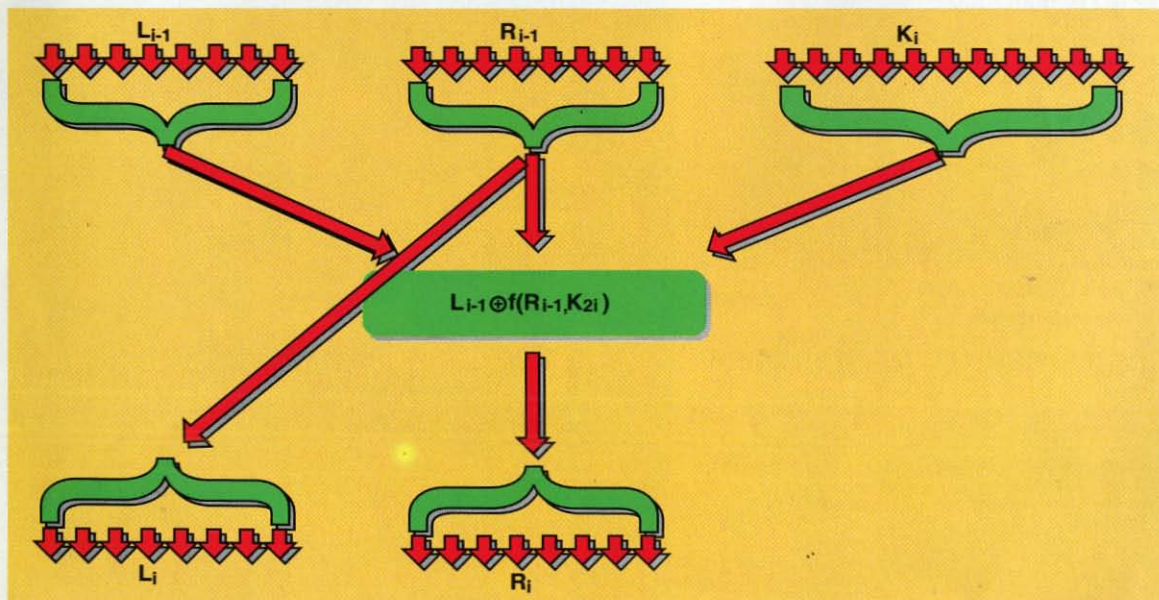


Figure II: Each iteration stage



we use for all programs there is also a certain amount of built-in checking to ensure the programs work correctly. But before you start encrypting all your favourite files make backups and ensure you can decode them too.

How it works

The algorithm uses a 64 bit plain text message and a 64 bit key although

this is assumed to contain parity bits and so is reduced to 56 bits.

Figure 1 is an outline of the DES algorithm and it can be broken down into 19 distinct stages:

Stage 1 A 64 bit transposition is made on the text.

Stages 2 to 17 These 16 iterations are parameterised by the 56 bit key.

Stage 18 The left and right 32 bits of the text are swapped.

Stage 19 A final transposition – the bits are swapped around – is done

on the text, yielding the cipher text.

Figure 11 shows what happens in the 16 stages that involve the key: Each stage takes two 32 bit inputs and produces two corresponding 32 bit outputs.

The left output is simply a copy of the right input while the right output is the bitwise Exclusive Or of the left input and a function of the right input and the key for that particular iteration.

● The function is composed of four

steps:

● The 32 bit right hand number is expanded to 48 bits.

● This is Exclusive Ored with the key currently in use.

● The result is split up into eight 6 bit groups.

These are then reduced to eight 4 bit groups, generating the required 32 bits.

Deciphering is very similar to encrypting, except that the 16 iteration stages are run in reverse order.

```
10 REM Data Encryption Standard
20 REM by Carl Dunkley
30 REM (c) The Micro User
40 :
50 MODE7
60 IF PAGE<2300 THEN PAGE=2300:CHAIN
"INITDES"
70 PX=1900
80 :
90 PRINTSPC(8)"DATA ENCRYPTION STAND
RD"
100 PRINT"SPC(8)"By C.Dunkley (Dec 199
0)"
110 PRINT"STRINGS(40,"-");
120 PRINT"Initialising look-up tables
"
130 PROCSetup_lookup_tables
140 PRINT"Assembling"
150 PROCAssemble
160 PRINT"Checking algorithm"
170 PROCcheck
180 PRINT"Saving machine code"
190 *SAVE DES_MC 1900+900
200 PRINT"STRINGS(40,"-");
210 PRINT"Successfully, assembled DES
_MC program."
220 PRINT"Key = &;initkey;" Plain/c
ipher text = &;inittext
230 PRINT"MC Loaded at 1900"
240 PRINT"Ensure page is set to 2300"
250 PRINT"Call &;des;" to encrypt te
xt"
260 PRINT"Call &;ddes;" to decipher
text"
270 END
280 REM *****
290 :
300 DEFPROCcheck
310 text$="12345678"
320 $initkey="12345678"
330 $inittext=text$
340 CALLdes
350 CALLddes
360 IF text$=<$inittext THEN PRINT"Fir
st check failed":END
370 text$=CHR$(177)+CHR$(35)+CHR$(167
0)+CHR$(35)+CHR$(35)
380 key$=text$
390 $initkey=key$
400 $inittext=text$
410 CALLdes
420 text$=CHR$(140)+CHR$(166)+CHR$(77)+CHR$(2
33)+CHR$(193)+CHR$(177)+CHR$(35)+CHR$(167
430 IF text$=<$inittext THEN PRINT"Sec
ond check failed":END
440 ENDPROC
450 REM *****
460 :
470 DEFPROCassemble
```

```
480 RI=P1
490 FORN1=0 TO 25 STEP 2
500 PI=RI
510 OPTN1
520 .copy
530 LDA(870),Y:STA(872),Y:DEY:BNEcopy:
RTS
540 .transpose
550 LDA(874),Y:STY(87F):TAY:LDA(872),Y:L
DY(87F):STA(870),Y:DEY:BNEtranspose:RTS
560 .eor
570 LDA(876),Y:EOR(878),Y:STA(87A),Y:D
EY:BNEeor:RTS
580 .rotatleft
590 LDA(key% MOD 256:STA870
600 LDA(key% DIV 256:STA871
610 LDA(key%+1) MOD 256:STA872
620 LDA(key%+1) DIV 256:STA873
630 LDA(rotate1% MOD 256:STA874
640 LDA(rotate1% DIV 256:STA875
650 LDY(87E
660 LDA(874),Y:TAX
670 .loop0
680 LDY(1:LDA(870),Y:STA87F
690 LDY(29:LDA(870),Y:STA880
700 LDY(1
710 .loop1
720 LDA(872),Y:STA(870),Y:INY:CPY#56:B
NEloop1
730 LDY(28:LDA(87F:STA(870),Y
740 LDY(56:LDA(880:STA(870),Y
750 DEX
760 BNEloop0
770 RTS
780 .rotateright
790 LDA(key% MOD 256:STA870
800 LDA(key% DIV 256:STA871
810 LDA(key%-1) MOD 256:STA872
820 LDA(key%-1) DIV 256:STA873
830 LDA(rotate2% MOD 256:STA874
840 LDA(rotate2% DIV 256:STA875
850 LDY(87E
860 LDA(874),Y:TAX:BNEloop0:RTS
870 .loop00
880 LDY(28:LDA(870),Y:STA87F
890 LDY(56:LDA(870),Y:STA880
900 LDY(56
910 .loop11
920 LDA(872),Y:STA(870),Y:DEY:CPY#51:B
NEloop11
930 LDY(1:LDA(87F:STA(870),Y
940 LDY(29:LDA(880:STA(870),Y
950 DEX
960 BNEloop00
970 RTS
980 .reduce
990 LDA($_box1-64) MOD 256:STA874
1000 LDA($_box1-64) DIV 256:STA875
1010 LDY(8:STA880
```

```
1020 .loop2
1030 LDA(6:CLC:ADC(870:STA870:LDA(0:ADC(
71:STA871
1040 LDA(4:CLC:ADC(872:STA872:LDA(0:ADC(
73:STA873
1050 LDA(64:CLC:ADC(874:STA874:LDA(0:ADC(
875:STA875
1060 LDA(0:STA87F
1070 LDY(1:LDA(870),Y:BEQnot32:LDA#32:
STA87F
1080 .not32 LDY(6:LDA(870),Y:BEQnot16:L
DA(16:CLC:ADC(87F:STA87F
1090 .not16 LDY(2:LDA(870),Y:BEQnot8:L
DA(8:CLC:ADC(87F:STA87F
1100 .not8 LDY(3:LDA(870),Y:BEQnot4:L
DA(4:CLC:ADC(87F:STA87F
1110 .not4 LDY(4:LDA(870),Y:BEQnot2:IN
C(87F:INC(87F
1120 .not2 LDY(5:LDA(870),Y:BEQnot1:IN
C(87F
1130 .not1 LDY(7F:INY
1140 LDA(874),Y:STA87F
1150 LDY(1:LDX(0:AND(8:BEQnot8:LDX#1
1160 .not8 TXA:STA(872),Y:LDX(0:LDY(2:
LDA(87F:AND(4:BEQnot4:LDX#1
1170 .not4 TXA:STA(872),Y:LDX(0:LDY(3:
LDA(87F:AND(2:BEQnot2:LDX#1
1180 .not2 TXA:STA(872),Y:LDX(0:LDY(4:
LDA(87F:AND(1:BEQnot1:LDX#1
1190 .not1 TXA:STA(872),Y
1200 DEC(80:LDA(880:BEQfini:JMPloop2:.fi
ni RTS
1210 .expand_text
1220 LDA(1:STA880:LDA(0:STA87F
1230 .loop6
1240 LDY(6F:INC(87F:LDA(870),Y
1250 LDY(80
1260 LDY(0:STA87E:AND(128:BEQnot128:LDX#
1
1270 .n128 TXA:STA(872),Y:INY:LDX(0:LDA
(87E:AND(64:BEQnot64:LDX#1
1280 .n64 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(32:BEQnot32:LDX#1
1290 .n32 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(16:BEQnot16:LDX#1
1300 .n16 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(8:BEQnot8:LDX#1
1310 .n8 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(4:BEQnot4:LDX#1
1320 .n4 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(2:BEQnot2:LDX#1
1330 .n2 TXA:STA(872),Y:INY:LDX(0:LDA(
7E:AND(1:BEQnot1:LDX#1
1340 .n1 TXA:STA(872),Y:INY:STY(880
1350 LDA(87F:CMPI(8:BNEloop6:RTS
1360 .shrink_text
1370 LDY(0:LDY(1:STY(880
1380 .loop7
1390 LDA(0:STA87F
```

```
1400 LDY(80
1410 LDA(870),Y:BEQnot128:LDA(128:STA87F
1420 .n128 INY:LDA(870),Y:BEQnot64:LDA(
64:CLC:ADC(87F:STA87F
1430 .n64 INY:LDA(870),Y:BEQnot32:LDA(3
2:CLC:ADC(87F:STA87F
1440 .n32 INY:LDA(870),Y:BEQnot16:LDA(1
6:CLC:ADC(87F:STA87F
1450 .n16 INY:LDA(870),Y:BEQnot8:LDA(8
:CLC:ADC(87F:STA87F
1460 .n8 INY:LDA(870),Y:BEQnot4:LDA(4
:CLC:ADC(87F:STA87F
1470 .n4 INY:LDA(870),Y:BEQnot2:INC(87F
:INC(87F
1480 .n2 INY:LDA(870),Y:BEQnot1:INC(87F
1490 .n1 INY
1500 STY(880
1510 TXA:TAY:LDA(87F:STA(872),Y
1520 INX:CPY(8:BNEloop7
1530 RTS
1540 **** main loop
1550 .initkey EQU(0:EQU(0:EQU(0
1560 .inittext EQU(0:EQU(0:EQU(0
1570 .ddes
1580 LDA(1:STA881
1590 JMPstart
1600 .des
1610 LDA(0:STA881
1620 .start
1630 OPT FNeexpand_text(initkey,key%)
1640 OPT FNeexpand_text(inittext,text%)
1650 OPT FNtranspose(key%,64,key_trans1
%,56)
1660 OPT FNtranspose(text%,64,init_tran
s%,64)
1670 LDA(1:STA87E
1680 .main
1690 OPT FNekey(text%,64,64)
1700 OPT FNekey(text%,32,32)
1710 OPT FNekey(text%,64,64)
1720 OPT FNtranspose(e%,64,bst%,48)
1730 LDA(81:BNEnotleft:JSRrotateright:J
MPcont1
1740 .notleft JSRrotateright
1750 .cont1
1760 OPT FNekey(key%,ikey%,56)
1770 OPT FNtranspose(ikey%,56,key_tran
s%,48)
1780 OPT FNeor(e%,ikey%,48,y%)
1790 OPT FNeor(e%,x%,i)
1800 OPT FNtranspose(x%,32,perm%,32)
1810 OPT FNeor(b%,x%,32,32)
1820 INC(87E:LDA(87F:CMPI(17:BEQend_des:J
MPin:.end_des
1830 OPT FNtranspose(text%,64,swap%,64)
1840 OPT FNtranspose(text%,64,final_tra
ns%,64)
1850 OPT FNshrink_text(text%,inittext)
```




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- Independent control of bold, italic, 'thin' and underline characteristics of the system font
- Proportional spacing of both external and system fonts
- Stretching and compressing of any area
- Pixel editing via zoom facility
- Up to A5 page design
- No special disc format
- Four fonts provided
- Font Designer supplied
- Built-in Graphic designer
- Import text or type direct
- Can import cut-outs
- Built-in Mode converter



Database Publications' DTP

5.25in DFS 40/80 track disc (only) £14.95

Due to the complexity of the program the fill routines will not function correctly with the B+, Master or Compact - all other features are compatible



```
1860 RTS
1870 JNEXT
1880 ENDP
1890 REM *****
1900 :
1910 DEFN reduce(source%,destination%)
1920 OPTN%
1930 LDA#(source%-6) MOD256:STA#70
1940 LDA#(source%-6) DIV256:STA#71
1950 LDA#(destination%-4) MOD256:STA#72
1960 LDA#(destination%-4) DIV256:STA#73
1970 JSR reduce
1980 J:=N%
1990 ENDP
2000 REM *****
2010 :
2020 DEFN near(source1%,source2%,size%,d
estimation%)
2030 OPTN%
2040 LDA#source1% MOD256:STA#76
2050 LDA#source1% DIV256:STA#77
2060 LDA#source2% MOD256:STA#78
2070 LDA#source2% DIV256:STA#79
2080 LDA#destination% MOD256:STA#7A
2090 LDA#destination% DIV256:STA#7B
2100 LDY#size%
2110 JSR near
2120 J:=N%
2130 ENDP
2140 REM *****
2150 :
2160 DEFN ncopy(source%,destination%,siz
e%)
2170 OPTN%
2180 LDA#source% MOD256:STA#70
2190 LDA#source% DIV256:STA#71
2200 LDA#destination% MOD256:STA#72
2210 LDA#destination% DIV256:STA#73
2220 LDY#size%
2230 JSR ncopy
2240 J:=N%
2250 ENDP
2260 REM *****
2270 :
2280 DEFN transpose(source%,old_length%
,table%,new_length%)
2290 OPTN%
2300 OPT Fncopy(source%,data%,old_lengt
h%)
2310 LDA#table% MOD256:STA#74
2320 LDA#table% DIV256:STA#75
2330 LDY#new_length%
2340 JSR transpose
2350 J:=N%
2360 ENDP
2370 REM *****
2380 :
2390 DEFN PROCS setup_lookup_tables
2400 RESTORE
2410 init_trans% = FNload-1
2420 final_trans% = FNload-1
2430 swap% = FNload-1
2440 key_trans1% = FNload-1
2450 key_trans2% = FNload-1
2460 bst% = FNload-1
2470 perm% = FNload-1
2480 s_box% = FNload-1
2490 FOR loop0% = 1 TO 7
2500 dummy% = FNload-1
2510 NEXT
2520 rotate1% = FNload-1
2530 rotate2% = FNload-1
2540 data% = P%-1
2550 P% = P%+64
2560 key% = P%-1
2570 P% = P%+64
```

```
2580 text% = P%-1
2590 P% = P%+64
2600 e% = P%-1
2610 P% = P%+64
2620 b% = P%-1
2630 P% = P%+64
2640 x% = P%-1
2650 P% = P%+32
2660 ikey% = P%-1
2670 P% = P%+56
2680 y% = P%-1
2690 P% = P%+48
2700 ENDP
2710 REM *****
2720 :
2730 DEFN load
2740 Q% = P%-1
2750 FOR loop1% = 1 TO 2
2760 V% = 0
2770 READ string$
2780 FOR loop2% = 1 TO LEN(string$) STEP
2
2790 ?P% = VAL(MID$(string$,loop2%,2))
2800 V% = V%+?P%
2810 P% = P%+1
2820 NEXT
2830 READ CX
2840 IF CX <= 0 THEN PRINT "Check sum err
or, "in "; string$; END
2850 NEXT
2860 Q% = 0
2870 REM *****
2880 :
2890 DEFN expand_text(source%,destinati
on%)
2900 OPTN%
2910 LDA#source% MOD256:STA#70
2920 LDA#source% DIV256:STA#71
2930 LDA#destination% MOD256:STA#72
```

```
2940 LDA#destination% DIV256:STA#73
2950 JSR expand_text
2960 J:=N%
2970 ENDP
2980 REM *****
2990 :
3000 DEFN shrink_text(source%,destinati
on%)
3010 OPTN%
3020 LDA#source% MOD256:STA#70
3030 LDA#source% DIV256:STA#71
3040 LDA#destination% MOD256:STA#72
3050 LDA#destination% DIV256:STA#73
3060 JSR shrink_text
3070 J:=N%
3080 REM *****
3090 :
3100 REM initial transposition
3110 DATA 58504234261810026052443628201
2046254463830221406645648403221608,1056
3120 DATA 5749413325170901595133527191
10361534537292113056355473931231507,1024
3130 :
3140 REM final transposition
3150 DATA 40084816562464323907471555236
33138064614542262303705451353216129,1104
3160 DATA 3604441252206028305343151195
92734024210501858263301410949175725,976
3170 :
3180 REM swap
```

```
3190 DATA 33343536373839404142434445464
74849505152535455565758596061626364,1552
3200 DATA 0102030405060708091011121314
51617181920212223242526272829303132,528
3210 :
3220 REM key transposition 1
3230 DATA 57494133251709015850423426181
002595143352719110360524436,912
3240 DATA 63554739312315076254463830221
406615345372921130528201204,880
3250 :
3260 REM key transposition 2
3270 DATA 14171124010503281506211023191
2042608160727201302,332
3280 DATA 4152313747553040514533484493
956345346250362932,1020
3290 :
3300 REM bit selection table
3310 DATA 32010203040504050607080908091
0111213121314151617,236
3320 DATA 16171819202120212223242524252
6272829282930313201,556
3330 :
3340 REM permutation table
3350 DATA 16072021291228170115232605183
110,279
3360 DATA 02082414322703091913300622110
425,249
3370 :
3380 REM $ boxes, 1 to 8
3390 DATA 14041301021511080310061205090
00700150704140213011006121109050308,240
3400 DATA 04011408130602111512090703100
50015120802040901070511031410000613,240
3410 :
3420 DATA 15010814061103040907021312000
51003130407150208141200011006091105,240
3430 DATA 00140711100413010508120609030
21513081001031504021106071200051409,240
```

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10 = 0 0	390 = 3731 0	770 = 9843 7	1150 = AEB1 3	1530 = 9843 0	1910 = D986 E	2290 = 6A96 F	2670 = F901 6
20 = 0 0	400 = 4598 3	780 = 8098 C	1160 = 6091 F	1540 = 0 0	1920 = 6A96 1	2300 = 4B5B C	2680 = 8AF5 9
30 = 0 0	410 = 721A 8	790 = C201 6	1170 = EB0B 1	1550 = E842 C	1930 = B652 2	2310 = A960 D	2690 = 2BFE 9
40 = 9719 9	420 = 9A70 3	800 = 7243 C	1180 = C8C7 4	1560 = EC60 F	1940 = 6C0 8	2320 = 19F2 3	2700 = E0DF 8
50 = 8AFC 8	430 = 6280 8	810 = 3550 C	1190 = 4310 A	1570 = A9BF 2	1950 = C490 6	2330 = C480 B	2710 = 0 8
60 = FB80 0	440 = E0DF 5	820 = 85C2 7	1200 = 41EA 6	1580 = 46C5 3	1960 = 7402 B	2340 = 2A3A E	2720 = 9719 4
70 = 4A64 6	450 = 0 5	830 = FA9 2	1210 = 2F1 2	1590 = A770 8	1970 = FD2 2	2350 = ADFA 3	2730 = FC16 B
80 = 9719 6	460 = 9719 F	840 = BF38 8	1220 = 7282 1	1600 = 689A 8	1980 = ADFA C	2360 = E0DF 8	2740 = C9E4 1
90 = 6A9C 6	470 = 98E9 E	850 = CF04 9	1230 = 43F6 5	1610 = 116 D	1990 = E0DF A	2370 = 0 8	2750 = 9671 A
100 = AD06 5	480 = 2736 9	860 = 48C4 0	1240 = FE37 5	1620 = 3208 A	2000 = 0 A	2380 = 9719 F	2760 = 7A0E 2
110 = CCA 0	490 = 2395 A	870 = 1252 6	1250 = F108 2	1630 = 4C0A 1	2010 = 9719 5	2390 = 750C 4	2770 = 080A 1
120 = 146E 1	500 = 507 B	880 = CAAB A	1260 = 999C F	1640 = C482 B	2020 = B908 B	2400 = 9FF8 D	2780 = E055 B
130 = AB80 9	510 = 6A96 4	890 = 38E3 0	1270 = 99F 1	1650 = B55E A	2030 = 6A96 1	2410 = 1E16 4	2790 = 62FE 9
140 = C114 8	520 = 55AF D	900 = C82 4	1280 = 5857 A	1660 = C089 C	2040 = 378 A	2420 = 25E7 1	2800 = B0A5 A
150 = 126A 7	530 = 989F A	910 = 3142 F	1290 = 4921 6	1670 = 68E8 4	2050 = B3EA A	2430 = 30C 4	2810 = 5569 B
160 = 44E 0	540 = B805 5	920 = 4447 B	1300 = 0532 6	1680 = 37E9 A	2060 = 6F15 3	2440 = C408 9	2820 = 2C83 1
170 = C2CC 1	550 = 2066 F	930 = C4A8 3	1310 = 1007 F	1690 = B8C2 9	2070 = FD87 6	2450 = B2F1 3	2830 = 965A 8
180 = 38C2 8	560 = A04E A	940 = 4E0 F	1320 = 4490 C	1700 = DCC 5	2080 = 68F8 F	2460 = C8AF C	2840 = 987C 8
190 = 32EB 6	570 = A6A7 3	950 = E8A9 D	1330 = E6C8 B	1710 = 7383 A	2090 = F828 F	2470 = 5EAF 9	2850 = 2C83 7
200 = CCA 5	580 = AC32 7	960 = B818 6	1340 = 9AEF A	1720 = 88C 5	2100 = EFEE A	2480 = 760D 4	2860 = CE8D 9
210 = 7ECF A	590 = C201 8	970 = 9843 6	1350 = 75AC B	1730 = 9A95 9	2110 = BAFB C	2490 = 8107 2	2870 = 0 9
220 = AA7A E	600 = 7243 F	980 = 6A88 8	1360 = 2F10 A	1740 = A205 1	2120 = ADFA F	2500 = 21C4 0	2880 = 9719 5
230 = 7026 9	610 = E338 0	990 = B6C2 D	1370 = F668 0	1750 = AD1C F	2130 = E0DF C	2510 = 2C83 A	2890 = 7022 7
240 = CED0 8	620 = 55A9 7	1000 = 650 C	1380 = 5307 1	1760 = 4E4A 5	2140 = 0 C	2520 = C714 7	2900 = 6A96 C
250 = 8C2E 9	630 = 820A 2	1010 = BE75 D	1390 = 1F58 D	1770 = 00DA 0	2150 = 9719 6	2530 = BFEF E	2910 = B803 4
260 = 83C2 F	640 = 3298 E	1020 = 372 C	1400 = F108 F	1780 = EE8E E	2160 = C138 4	2540 = 5466 8	2920 = 3841 E
270 = FD2E 2	650 = CF04 6	1030 = 4083 0	1410 = 6929 4	1790 = 636E B	2170 = 6A96 7	2550 = 8C10 D	2930 = 260F 6
280 = 0 2	660 = 1784 D	1040 = 50D6 8	1420 = 784A B	1800 = EC66 C	2180 = B803 5	2560 = B360 5	2940 = 6A96 0
290 = 9719 3	670 = 2330 A	1050 = 5758 2	1430 = 8A99 1	1810 = A56 9	2190 = 3841 A	2570 = 8C10 5	2950 = 25EA D
300 = 69A8 1	680 = 62CE 8	1060 = 1F5B 9	1440 = F67F 2	1820 = B7F2 8	2200 = 260F F	2580 = 374 3	2960 = ADFA 2
310 = D657 3	690 = 1A0B 1	1070 = 8A80 A	1450 = 583F 7	1830 = 25A1 9	2210 = 9699 5	2590 = 8C10 D	2970 = E0DF C
320 = 4023 8	700 = 8886 9	1080 = 0277 0	1460 = 3088 4	1840 = D46B 8	2220 = EFEE 7	2600 = DFEE 8	2980 = 0 C
330 = 459B E	710 = 3311 F	1090 = 78E 9	1470 = FF99 D	1850 = 78A6 F	2230 = 5304 3	2610 = 8C10 0	2990 = 9719 4
340 = 721A 6	720 = 1F96 0	1100 = 439 3	1480 = A200 7	1860 = 9843 1	2240 = ADFA 2	2620 = C6A1 A	3000 = 7662 8
350 = 94C4 5	730 = 942E C	1110 = E8F6 3	1490 = 4C82 1	1870 = 5460 4	2250 = E0DF E	2630 = 8C10 1	3010 = 6A96 0
360 = 768B E	740 = 2605 D	1120 = 8711 1	1500 = 2A05 1	1880 = E0DF 0	2260 = 0 E	2640 = 294 1	3020 = B803 2
370 = 48B 6	750 = E8A9 8	1130 = 7A70 1	1510 = CF89 E	1890 = 0 0	2270 = 9719 9	2650 = 1323 B	3030 = 3841 4
380 = B845 C	760 = 2998 6	1140 = 93C0 B	1520 = C49 C	1900 = 9719 4	2280 = A6A9 6	2660 = ED74 9	3040 = 260F 4



```

3440 :
3450 DATA 10000914060315050113120711040
20813070009030406100208051412111501,240
3460 DATA 1306040908150001101021205101
40701101300060908070415140311050212,240
3470 :
3480 DATA 07131403000609100102080511120
4151308110506150003040702101101409,240
3490 DATA 10060900121107131501031405020
80403150006100113080904051112070214,240
3500 :
3510 DATA 02120401071011060805031513001
40914110212040713010500151003090806,240
3520 DATA 04020111101307081509120506030
01411081207011402130615000910040503,240
3530 :
3540 DATA 12011015090206080013030414070
51110150402071209050601131400110308,240
3550 DATA 09141505020812030700041001131
10604030212090515101114010706000813,240
3560 :
3570 DATA 04110214150008130312090705100
60113001107040901101403051202150806,240
3580 DATA 01041113120307141015060800050
9020611130810410070905001514020312,240
3590 :
3600 DATA 13020804061511011009031405001
20701151308100307041205061100140902,240
3610 DATA 07110401091214020006101315030
50802011407041008131512090003050611,240
3620 :
3630 REM rotate left
3640 DATA 0101020202020202,14
3650 DATA 0102020202020201,14
3660 :
3670 REM rotate right
3680 DATA 0001020202020202,13
3690 DATA 0102020202020201,14

```

Get it right ✓

```

3050 = 969D C 3380 = 0 5
3060 = 80B 0 3390 = 4920 E
3070 = ADFA 2 3400 = 955E 4
3080 = 0 2 3410 = 9719 3
3090 = 9719 3 3420 = 2175 4
3100 = 0 3 3430 = 012F A
3110 = 57E2 3 3440 = 9719 4
3120 = 2063 6 3450 = 288A 0
3130 = 9719 D 3460 = 1E45 3
3140 = 0 D 3470 = 9719 F
3150 = 646B F 3480 = 2C11 5
3160 = F9BC 0 3490 = E05 F
3170 = 9719 1 3500 = 9719 A
3180 = 0 1 3510 = 5F62 C
3190 = F9FE 9 3520 = C177 1
3200 = 44E2 7 3530 = 9719 E
3210 = 9719 9 3540 = 68CA 6
3220 = 0 9 3550 = BC00 5
3230 = 6FAA 7 3560 = 9719 C
3240 = D0E 9 3570 = B68B 1
3250 = 9719 B 3580 = 8A0F 9
3260 = 0 B 3590 = 9719 0
3270 = C332 9 3600 = 9055 8
3280 = E8CC 4 3610 = 8B8 5
3290 = 9719 A 3620 = 9719 1
3300 = 0 A 3630 = 0 1
3310 = C3F7 7 3640 = B085 C
3320 = 71A5 A 3650 = CE14 7
3330 = 9719 E 3660 = 9719 9
3340 = 0 E 3670 = 0 9
3350 = 2595 7 3680 = 3053 0
3360 = 1166 6 3690 = CE14 5
3370 = 9719 5

```

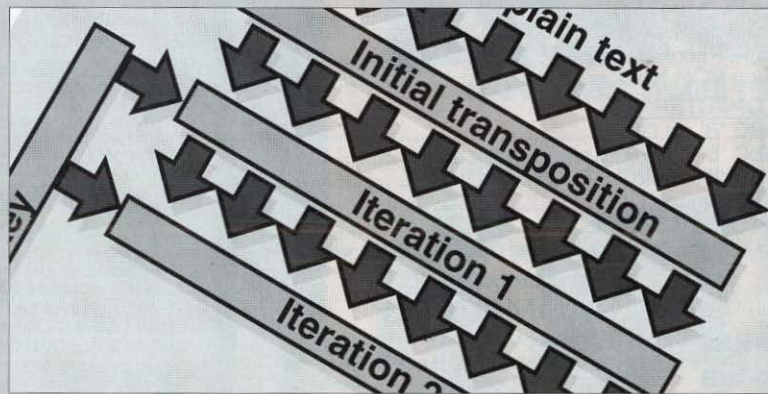
```

10 REM Data Encryption Standard
20 REM by Carl Dunkley
30 REM (c) The Micro User
40 MODE7
50 *KEY PAGE=82300/M*LOAD DES_MC/MCH
"DES" M
60 IF PAGE=82300 THEN 100
70 *FX 13 0 128
80 STOP
90 :
100 desX=820E2:keyX=820C9:textX=820D2:
ddesX=820D8
110 *FX 200 1
120 :
130 REPEAT
140 CLS
150 PRINT$PC(8);"DATA ENCRYPTION STAND
ARD"
160 PRINT$PC(8);"By C.Dunkley (Dec 1
990)"
170 PRINT$STRINGS(40,"-");
180 PRINT
190 key$=""
200 FOR N1=1 TO 8
210 INPUT "File name : ",in$
220 INPUT TAB(0,7);"Key : ",key$
230 PRINT TAB(0,7);SPC(40);
240 IF LEN(key$) < 8 THEN 220
250 PRINT TAB(0,7);"Cipher or Decipher
:"
260 REPEAT
270 AS=CHR$(GET OR32)
280 UNTIL AS="c" OR AS="d"
290 PRINT;AS;
300 PRINT
310 IF LEN(key$) < 8 FOR LOOP1=LEN(key$) TO 7:ke
y$=key$+CHR$(0):NEXT
320 FX=OPENUP(in$)
330 SZ=EXT$(FX)
340 NX=SZDIV8
350 IF NX<=SZ/8 THEN PROCmessage
360 $key=key$
370 O1=0
380 PRINT TAB(0,12);"Iterations Left :
";
390 FOR LOOP1=1 TO NX
400 PTR#FX=0X
410 text$=""
420 FOR LOOP1X=0 TO 7
430 text$=text$+CHR$(BGET$(FX))
440 NEXT
450 StextX=text$
460 IF AS="c" CALL DdesX ELSE CALL DdesX
470 PTR#FX=0X
480 FOR LOOP1X=0 TO 7
490 BPUT$(FX,2(textX+loop1X))
500 NEXT
510 PRINT TAB(18,12);NX-loop1X; " ";
520 O1=O1+8
530 NEXT
540 CLOSE#FX
550 PRINT;"Finished"
560 PRINT$STRINGS(40,"-");
570 PRINT;"Another file (Y/N)?";
580 REPEAT
590 AS=CHR$(GET OR32)
600 UNTIL AS="y" OR AS="n"
610 UNTIL AS="n"
620 CLS
630 END
640 REM *****
650 :
660 DEF PROCmessage
670 PRINT;"The file size is not divisab
le by 8,"
680 AX=SZ-8*(SZDIV8)
690 PRINT;"the last ";AX;" byte(s) will
not be altered."
700 ENDPROC
>*1.XS

```

Get it right ✓

10 = 0 0	140 = 7A16 B	270 = 45EA B	400 = BE33 F	530 = 2C83 5	630 = F02E E
20 = 0 0	150 = 2546 3	280 = DE44 4	410 = B76D D	540 = 574F A	640 = 0 E
30 = 0 0	160 = 6C01 A	290 = C07E E	420 = 43E9 9	550 = 48FC 3	650 = 9719 9
40 = 8AFC C	170 = CCA B	300 = 7475 7	430 = 12C0 A	560 = B9B0 5	660 = 429C E
50 = 6CA5 6	180 = FF3E 2	310 = FABB 6	440 = 2C83 F	570 = 5C17 5	670 = 74A7 C
60 = A667 8	190 = 4F39 8	320 = 7554 8	450 = EBD8 2	580 = BFBA 6	680 = A223 5
70 = 193D 0	200 = C634 9	330 = 7CE4 7	460 = B063 1	590 = 45EA 3	690 = E259 A
80 = 4E55 3	210 = 99C2 8	340 = A8DA A	470 = BE33 0	600 = 8DE9 2	700 = E0DF C
90 = 9719 2	220 = 2B2 8	350 = 8A8 4	480 = 43E9 B	610 = B45C 1	>*SP.
100 = 4052 9	230 = FC02 D	360 = B8E1 B	490 = C0F0 0	620 = 7A16 5	
110 = 6ABE 3	240 = 62DE 5*	370 = 92DE 7	500 = 2C83 A		
120 = 9719 8	250 = A317 A	380 = F62C F	510 = 1B85 2		
130 = BFBA 1	260 = BFBA 9	390 = 31D9 E	520 = B69B 9		



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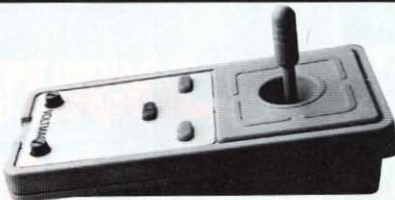
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I AM 11 years old and have an Electron. Nearly all my friends have Amigas and Atari STs and they say that I should buy a new computer.

The problem with those machines is that software for them is very expensive whereas on the Electron and BBC Micro you can buy excellent software for just £2.

Electrons and BBC Micros – not forgetting Amigas and the others – are much better than games consoles.

Name me a games console with a keyboard, cheap games and the ability to save things on to discs and tapes.

They do have good graphics, but so does the Electron, just take Barbarian, Code-name: Droid, Stryker's Run and Hostages.

Even then graphics aren't everything. I think playability is the main thing: Chukie Egg is one of the best games I've ever played and yet there are hardly any graphics.

My only problem is having a 3.5in drive, there's only a limited number of games for me. – **Graham Lally, Kingston upon Thames, Surrey.**

Running school networks

WE have recently bought 10 A3000s and linked them with the existing 20 BBC Micros on our school network.

Unfortunately the Australian software market doesn't support Acorn machines as well as it should and many old BBC Micro retailers have fallen by the wayside.

Consequently I am searching for assistance from high school teachers and enthusiasts who could help with some inexpensive software.

Having just spent a vast

The Electron has its advantages

amount of money on the hardware we're left with very little for software.

Are there any schools in the UK who would be interested in being linked with ours either by disc/post or modem, for a sort of student liaison scheme?

On a different subject, I once saw a Star Trek game, based on the original TV series, for the Atari ST. Is it available for the BBC Micro or Archimedes? – **Patrick Carswell, Chancel College, 11 Patterson Street, Gladstone QLD 4680, Australia.**

● Low priced software is most easily available from the public domain libraries, though there's no guarantee of quality.

The Star Trek game you mention suffered very badly from piracy.

An early version was stolen and copies quickly spread throughout the world.

Although it was released eventually – considerably different to the pirated version – its sales were not encouraging.

There is no Archimedes version and it's unlikely there will be one in the near future.

Infinite bombs on Bombed

I REALLY enjoyed playing Bombed from the February issue, but it can be very annoying to run out of dynamite.

So here's a cheat that goes

in Listing 11 to give you an extra bomb every time you use one:

```
510 DEFPROCbombdrop:SI(XI,YI)
=2:BX=1:BOMBI=BOMBI+2:BX=XI:
BYI=YI:PROC:ENDPROC
```

And if you want infinite lives change line 470:

```
470 UNTIL LX=15
```

–**Michael Ballinger, Cirencester.**

Way to run !DangerDog

I HAVE just upgraded my subscription to receive the Archimedes disc. On receiving my first one I followed the instructions and managed to extract both !DangerDog and !King from the archive and put them in the ram disc and then on to a floppy.

But when attempting to remove the ram disc I found it impossible to delete !King, so in the end I was forced to switch the machine off. I was able to delete !DangerDog, so what went wrong?

Also when attempting to load either of these into Basic so I could run them I just got the ... Is a directory error message.

It must be possible to load and run these programs because they were Basic listings printed in the magazine. I don't particularly want to type them in from the magazine again, so what's wrong here?

Another peculiarity emer-

or no modification – apart from the inevitable problems with different screen modes.

In addition, it seems to offer some real advantages over QuickBasic – one of the most popular PC Basics – such as SPOOL and EXEC files, user-defined function keys, the integral 8088 assembler and the ability to print text at the graphics cursor. – **Sebastian Lazareno, Ware, Herts.**



ged with the ShopList program. I transferred it to floppy and ran it, saving the file I created to the floppy, as expected.

But when I came back later I double-clicked ShopList from the DeskTop but it just wouldn't load the file that was on the disc – it kept looking on the hard disc, so couldn't find it.

But when I loaded the program into Basic it loaded the shop file from the floppy disc without difficulty! What is going on? Surely this defeats the whole object of the DeskTop?

Incidentally only !King has any sound. I hope you can help – **W. Cummins, Chingford, London.**

● Well that's quite a list of problems, but they're all fairly simple to solve.

The first step is to understand that !DangerDog and !King are not Basic programs – at least not entirely.

Technically they are called applications, which is to say directories that have a name beginning with !.

If you double-click them they will run, you don't need to

WANT to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Macclesfield SK10 4NP.

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load them into Basic – in fact you can't, as you discovered.

Inside these application directories are other files which include the Basic programs that were in the magazine, but heavily modified to run on the Archimedes.

The problem with deleting !King is that the both the main directory – and the files it holds – are locked.

To unlock them you must first Shift+double-click with Select (left hand button) on the application icon, which opens up the inside of the application directory without running it.

Now click Menu (middle button) over the Filer window that has just appeared and click on the Select all option using Adjust (right hand but-

Another Basic variant

I WAS interested to see a version of BBC Basic for the PC – BBasic 3 – being mentioned in the May Micro User News.

I use a different one, BBC Basic 86+ from M-Tec or Grey Matters.

Although it's a bit buggy and the editor is ghastly, it does provide a familiar environment for BBC Micro users. Most standard BBC Basic programs run correctly with little



ton). Now move up to *Selection* and slide across to the arrow, then on to the sub-menu and go down to *Access* and again slide across to the arrow to bring up the access dialogue box.

Make sure the first item does not have a star in it – click on it if it does – then click on the *Update* button to alter the files on disc.

Now do the same thing to the !King directory itself then use the *File* Menu to delete !King – all the sub-files will go as well. If they are locked !King cannot be deleted.

The problem with ShopList is more subtle: The *Filer* – which controls accesses to all file storage whatever media is used – maintains a default directory.

If a request is made to load or save a file and it isn't explicitly stated where the file should go, the default directory is used.

For example, the default directory might be *ads:fred.\$* which is the root directory of an ads disc called *fred*. So a command like:

```
SAVE"MYProg"
```

will save it to the default directory and if disc *fred* isn't in a disc drive you will be asked to insert it. On the other hand, the instruction:

```
SAVE"ram:$,Temp,MYProg"
```

will save the file in sub-directory *Temp* in the *ram* disc.

Your machine clearly has the hard drive set up as the

default directory, but why did it save to floppy sometimes?

Although you haven't said in your letter, we would guess that you get into *Basic* using a utility that sits on the icon bar.

And when you load a file into *Basic* using it, the utility sets the default directory to be the place that the *Basic* program has just come from. That's why it works from *Basic* but not from the *DeskTop*.

Although changing the default directory is bad programming practice on the *Archimedes*, you could add a line to the start of the *ShopList* program:

```
0 *DIR ads:$.0$
```

which will set the default directory to drive zero.

Due to the differences in sound between the 8 bit and 32 bit machines, conversion is not simple.

Viewstore for the Electron

DOES Viewstore exist for the Electron – version £1.00 perhaps? If it does where can I get a copy, either new or secondhand?

Also are there any public domain libraries for the Electron? I'd be interested in hearing from any. – A. B. Richardson, P.O. Box 5471, Wellesley Street, Auckland, New Zealand 1036.

● We spoke to Pres about this and they told us there's no special *Viewstore* for the *Electron* because the stan-

More winning ways

I READ with interest the Micro User article, Bucking the odds, written by Graham Kendall. About 10 years ago I used an Acorn Atom to investigate three even-money gambling systems.

Although it's interesting to see the variation in fortunes, the punter always loses. Here's a rundown on the three systems:

Martingale: This is a simple stake doubling system. Every time you lose double the stake for the next bet:

```
1 2 4 8 16 ...
```

So after three consecutive losses you'll be betting eight units. When you eventually win the net profit is one unit. This is a classic example of chasing your losses.

Straight Metropolitain: Make

a list of several numbers, for example:

```
1 3 5 7 9
```

The stake you place on the bet is the sum of the two end numbers, in this case four. If you win delete the numbers, if you lose add the value of the stake to the end of the list and calculate the new stake.

When the list is cleared the net profit is the list total.

Reverse Metropolitain: Make a list of several numbers, for example:

```
1 3 5 2 4 6
```

The stake is always the sum of the end numbers, in this case it's seven. If you lose delete the end numbers, if you win add the stake to the list.

The apparent advantage of this system is that you know

dard rom is compatible.

*However the disc supplied is 5.25in and it needs to be converted to 3.5in. Pres can also supply a set of notes for *Electron* users of *Viewstore* for £5.*

*As for getting hold of a copy, we're not so sure. Pres no longer have any, but you could try some other UK suppliers. As a final resort you could advertise for a copy in *The Micro User Classifieds*.*

Nothing ventured...

*I AM a regular reader of *The Micro User* and often type in*

the listings. I had a go at the Quick Commands program from Routine Matters in the May issue – but line 90 is missing.

Could you print it please because I can't work out what it should be. – N. J. Langridge, Swavesey, Cambs.

● We had to go back to the original for this – there is no line 90, the program just doesn't have one. But you can put one in if you like:

```
90 \ Nothing
```

More accurate time lines

*FOLLOWING the publication of my calendar programs for the 8 bit and 32 bit BBC Micros in the January 1991 issue of *The Micro User* you printed a letter by Michael Leete pointing out a couple of interesting historical features that I hadn't incorporated.*

Since then I have been in contact with Mr Leete who kindly provided details of what needed changing.

As a result I have produced new versions of the programs both of which now run from 1AD to 9999AD. –

PRIZE letter

what your losses are going to be and higher value bets are made with units gained rather than chasing losses.

If the gaming system to be simulated is roulette the stake must be an even number of units. This is to allow for a zero result where half the stake is returned. Also gaming houses usually apply limits to the maximum and minimum stake values.

If anyone finds a winning system I'd be very interested to know about it – but it's probably an error in the program. – Mike Carr, Sheffield.

Martyn Fox, Windsor, Berks.

● The two amended programs can be found on this month's subscription discs and tapes.

There's more all round

*I AM writing to complain about the way you've conned the readers. In the May issue you said that *The Micro User* was going to be wider but, looking at the June issue, all you've done is put a border on the edge. At least you didn't put the price up. – Peter Snow, Ilford, Essex.*

● True, there is a border – but there was an even bigger one before we changed the page size.

There are now four columns per page instead of three, or five where we used to have four. Which means we can get up to a third more information per page.

We have the same number of editorial pages as before, so that means you get even more in every bumper issue!

*And yes, we haven't changed the price which means *The Micro User* is even better value for money.*

Oh rats!

*When recently using my Arc
The mouse started having a lark
I had no luck
The pointer got stuck
And my optimism went dark*

*Oh what can the problem be
The buttons, well they work all three
It happened for days
In several ways
Oh what can this problem be*

*It's either the wire or ball
But it can't be the wire at all
'Cos I changed the mouse twice*

*(I had a plural of mice)
My temper was starting to fall*

*I decided to give it a wash
I gave it a soaping because
All of that muck
Was making it stuck
It saved me a whole load of dosh*

*After the mouse ball's first rinse
It's worked like a dream ever since
I hope that this message
Will make problems less-(age)
And that non-scanning rhyme made you
WINCE!
– Michael Youell, Sandy, Beds.*

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(see page 99)

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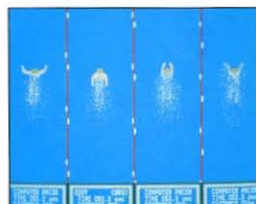


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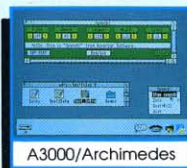
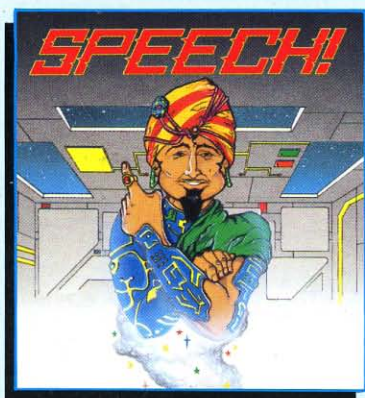
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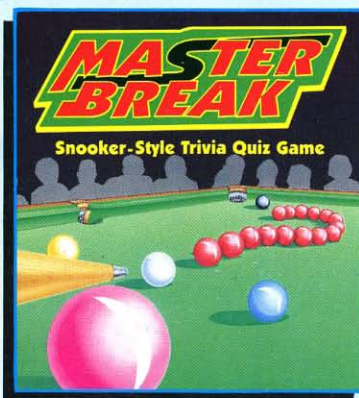
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- Cassettes and discs that are faulty on receipt will be replaced immediately

(This does not affect your statutory rights)